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ORIGINAL COMMUNICATIONS.

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SOME CLINICAL OBSERVATIONS IN INTRACRANIAL COMPLICATIONS OF OTITIC ORIGIN.*

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To attempt to discuss all the intracranial lesions of otitic origin, would be unwise and impractical because of the time it would require, and my lack of experience in dealing with many of them. Hence I have taken the liberty of changing the topic assigned me, so that I may present only those phases of these complications which I have met with in my own practice. The general discussion which is to follow the other papers on the programme will consider probably all the forms of intracranial complications resulting from otitis media, and in this more practical way will the entire subject be brought before the Academy. The topic is too important and time too short to attempt to bring before you a résumé of the literature of the subject. We gain more from the recital of individual experiences than from lengthy dissertations and conclusions drawn from others. This is a great American Academy, where each gives the other his personal Academic clinical experience learned at the bed side and operating table and often verified in the post mortem examination.

It is said that the father of otolgy, Professor Adam Politzer, in his introduction to his annual lectures on otology, takes up the temporal bone, and holding it in full view of the class of students, slowly and forcibly tells them:

The temporal bone has four sides, the outside is bounded by life, from which there comes through the opening of the external auditory canal one form of our appreciation of what life means; on the other three sides, this bone is bounded by death.

*President's address before the Twelfth Annual Meeting of the American Academy of Ophthalmology and Oto-Laryngology, Louisville, Ky., September 26, 27 and 28, 1907.

There is much truth and pathos in this statement especially when intracranial lesions are the result of a diseased condition of the temporal bone. But the dangers of years ago, when this grand old otologist first uttered these words, are being rapidly overcome by the advance of the medical and surgical science of today.

The only intracranial lesions of otitic origin I have met with are meningeal iritation (meningism), meningitis, extradural abscess and cerebral abscess involving the spheno-temporal lobe, and the lessons learned from these cases lead me to the discussion of the topic.

CASES OF INTRACRANIAL LESIONS OF OTITIC ORIGIN.

The number of cases which I have observed and whose histories have been recorded, is twenty-four, and each case was characterized by marked meningeal and cerebral symptoms, which operation revealed were of otitic origin or complication. They were not of that class, so often found in doing the mastoid operation, which had not previously given any symptoms of intracranial lesion. Of this number, seventeen of the patients were operated on, ten of whom recovered. In seven others, all the symptoms were improved by the operation, for from one to five days; three cases were meningism as described by Chevalier Jackson, which were of otitic origin.

In the seventeen cases operated on, one or several of the following conditions were found:

Two cases of abscess of the spheno-temporal lobe.

Five cases of extradural abscess in the middle fossa.

Four cases of extradural abscess in the inferior fossa.

Three cases of serous meningitis in which dark colored fluid was found under considerable pressure between the bone and dura in the middle fossa.

Eleven cases in which the tegmen tympani and antri were destroyed and the dura thickened (pachymeningitis).

Six cases in which the sinus was exposed; two were opened in removing the granulations covering them.

Two cases in which the facial ridge was eroded, exposing the nerve, temporary palsy resulting.

Five cases in which there were fistulous openings in the tegmen tympani.

Six cases in which there was optic neuritis (in both the spheno-temporal abscess cases and in four cases of extradural abscess in the inferior fossa.)

Four cases were due to acute otitic media.

Thirteen cases were due to a chronic otitis media.

In none of my cases was there a lateral sinus thrombosis or cerebellar abscess. Seven of the patients died without operation, and seven died who were operated on. Of the latter, I was able to obtain autopsies in six, two of which showed tubercular meningitis, with the center of infection over the area of the tegmen tympani of a chronic suppurative otorrhea; three were diffuse purulent meningitis, one was diffused meningitis with suppuration of the Gasserian ganglion complicating double mastoiditis. Since operation on intracranial lesions has proven to be life-saving, the interest of the otologist and general practitioner has become more active in these patients.

In the ordinary neglected otorrhea, swarms of micro-organisms are found, both saprophytic and pathogenic. The mere chronicity of an otorrhea without extension of serious disease is no guarantee to the individual of future immunity. Patients so affected, are at any time liable to the rapid onset of dangerous sequelæ, which may arise from fresh inoculations of the discharge in the middle ear, or from exposure of fresh area of the membrane brought about by progressive disintegration, and the implication of these fresh areas in the pathogenic process.

Chevalier Jackson says:

To look over the text-books and the periodical literature, one would suppose that the only pyogenic extension of purulent otitis media was by way of the mastoid cells. Yet we all see cases of intracranial extension through the tympanic roof. Are we then justified in considering mastoid empyema the only indication for opening the mastoid? Are we not culpable when we fail to advise and urge early operation on our patients with chronic otorrhea who are carrying about a foul discharge, offensive to their companions, rejected by insurance companies, and perhaps living in dread of an operation which they will likely come to sooner or later? The risks of operations are practically nil; the risks of postponement are great. To operate after an acute pyogenic invasion has affected the arachnoid, pia and cerebral fluids, while not a forlorn hope, is hazardous, and the percentages of recoveries reduced to more than one-half by the delay.

SYMPTOMS OF INTRACRANIAL COMPLICATIONS.

Symptoms of the several intracranial complications of otitic origin, in the initial stage are similar, and it is impossible without submitting the patient to the danger of delay of deeper and more extensive infection, by waiting for focalizing or pathognomonic evidence. For this reason emphasis should be placed on the danger especially of chronic suppuration of the middle ear, extending to the cranial cavity and sinuses of the dura, and at the first evidence of meningeal irritation, as manifested by persistent headaches, ver-

tigo, vomiting, somnolence or irritability, the radical operation should be performed, the dura exposed, examined, irrigated and drained through the tegmen tympani and antri.

It matters not whether there exists symptoms of mastoid infection. If the middle ear shows evidence of infection or there is a history of chronic suppuration having existed, I believe it best to advise immediate operation,

The infection most frequently takes place through fistulous openings in the tegmen or the walls of the temporal bone towards the dura and sigmoid sinus. Infection less often occurs without any demonstrable lesions in the bone, by means of the numerous anastomoses between the blood and lymph vessels of the cranial cavity. (Politzer).

In some of my most pronounced cases of intracranial disease, no pus was found at the operation and no evidence of active trouble existed in the tympanic cavity at the time, but the tegmen of the antrum, attic and tympanum were covered with granulations and the bone was soft and soggy, and gave the sensation more of cutting through wet chalk than through bone.

I am convinced, as pointed out by Körner, that in the early stage of infection of the basal meninges, inflammatory edema may produce the same symptoms as observed in extradural abscess. In three of my patients who recovered, extradural abscess of the tegmen associated with compression of the overlying temporal lobes and the cerebral injection was disproportioned to the extradural lesion. While there was in these cases no recognizable abnormality of the intervening arachnoid, by mere contiguity without plastic exudate, the infection had passed through and red softening had begun, which in a few days more would have formed a spheno-temporal abscess. In such cases, early operation in which free dainage is given and the infected area thoroughly irrigated, gives promise of favorable results.

The five extreme cases in which the patients recovered add increasing emphasis and hope to the plea for early operative interference in the class of cases under consideration, and I quite agree with Randal and others in the contention that in these cases and also in those of tuberculous meningitis the patients ought to be operated on and irrigation with warm physiologic saline solution practiced. In only three cases have I used lumbar puncture, and I am not sure that appreciable benefit resulted. In cases of serous meningitis, I shall continue to resort to it, but am convinced that drainage and irrigation through the middle fossa is the better treat-

ment. I have washed away quantities of purulent exudate in some of my fatal cases, and though too late to avail more than temporary relief, I am sure the procedure was correct.

Cases I have met with have been few and of the more simple form of intracranial disease of otitic origin, and some of them are open to question, but I am convinced that the suggestion of operating early, is the safer to follow and I have reason to believe that had I not waited so long in my first series of cases, and had my technic been better, the results would have been different.

To operate on a patient who will certainly die is a discredit to otology, and prevents or delays consent in other operable curable cases. To operate on a child whose symptoms are due, not to the extension of its ear disease, but to the toxemia of an acute infection, is to make a grave mistake. To fail to operate in a case of operable, curable mastoid or middle ear disease which is producing grave symptoms, is a fearful error. (Jackson).

To all of which I agree, but in this age, what excuse can there be for allowing a patient, except in very rare instances, to become hopeless before giving him the chance that only surgery can give?

I believe many of the hopeless cases and fatal results are due to delay and halting between two opinions. In these cases, everything is to be gained and nothing to be lost by the operation, and if the end is hastened a few hours and made easier by the operation, both relatives and attendants have the consolation of the knowledge, that all was done that could be. A forward step will be taken when our patients are taught this and also the wisdom of an autopsy whenever there is a reasonable request made. It is only in this way that the people and the profession will be made safer than they are now.

It must be remembered that there is such a difference in the contour and structure of the epitympanum and the mastoid as to justify the assertions that there is no bony structure in the human body which presents so many deviations from an arbitrary standard type as the normal epitympanum and mastoid process of the temporal bone. The same multiplicity of variations is found on the inner walls separating the mastoid from the cranial cavities.

It is also true that in intracranial complications of otitic origin, the definite symptoms of their existence unfortunately are either conspicuous by their absence or fallacious as to their significance, while the general condition of the patient may be such that the main localizing symptoms are incapable of demonstration. Especially is this true in cases of cerebral or cerebellar abscess. An exact diagnosis as to the location is often impossible and more than one op-

eration may be needed before the desired results are attained. In epidural abscess there frequently are no general symptoms of meningitis, nature walling off the area of meningeal inflammation from the cranial cavity and often thus effecting a spontaneous recovery.

In the cases of extradural abscess seen by me, all but three were epitympanic, the others were in the posterior fossa and were the only ones giving evidence of threatening serious brain trouble before the operation, these being of size and virulence sufficient to produce pressure and toxemia. In the former cases, there was no destruction of the bony walls bordering on the dura, the infection having taken place through a fistulous perforation in the wall. Had the bony roof of the tympanic and antral cavities been destroyed by the pathologic process, pus could not have collected between the dura and the bone.

Of course the more marked the symptoms of intracranial complications, the more urgent is the indication for operation. My own observations justify the conclusion, however, in cases of otitic disease whether acute or chronic, that symptoms of meningeal irritation are indications for immediate operation. Such symptoms are characterized by headache, photophobia, pain over the entire temporal bone, especially above the back of the ear, whether there be evidence of mastoid disease or brain pressure, with drooping eyelids, furred tongue and loss of appetite, slow pulse and sluggish pupils. Other brain symptoms such as somnolence, dizziness, vomiting, optic neuritis and nystagmus may occur associated with an extradural abscess, yet the appearance of these symptoms is not to be relied on for making a differential diagnosis.

Operative procedure need not subject the patient to greater dangers than already exist, and therefore can be undertaken before the advanced stages of meningitis have set in. As in threatened serious abdominal disease, appendicitis and peritonitis, immediate attempts are made to eliminate the primary focus of infection, so in the treatment of otitic meningitis, our aim should be to eradicate the primary suppuration in the temporal bone.

THE RESPONSIBILITY OF THE GENERAL PRACTITIONER.

Only recently has otology received the full recognition it deserves and the general practitioner who holds in his keeping the present and future health and hearing of his patients, is just beginning to awaken to his responsibility—of warning them of the necessity of the most careful and scientific treatment in the nasal and accessory sinuses. When this branch of the medical profession

is aroused, we will have fewer cases of deafness and intracranial disease.

It is the province of the general practitioner to warn parents of the danger of delay in having their children with nasopharyngeal disease, especially adenoids, or earache, promptly attended to. On his shoulders too, rests the responsibility of early recognizing the first evidence of intracranial irritation. The class of cases under consideration is seen first by him, and when the otologist is called, they have usually passed beyond the initial stage, and the alarming symptoms of meningeal irritation or inflammation are present. It is often impossible to state with any assurance, what the symptoms indicate, whether a serous meningitis, pachymeningitis or a leptomeningitis.

The one fact that now confronts parents, friends and medical attendants, is that the enemy is on them, and no enemy of the human body strikes with greater force and horror than the mention of meningitis or brain disease. The question now is not so much what phase of intracranial disease we have to contend with, but what shall we do? We are assured of the fact that unless the condition that exists is speedily brought to an end the patient has everything to gain and nothing to lose by our most heroic efforts.

If the well-known and accepted symptoms of the disease exist and there is evidence of suppuration in the ear, or history of previous suppuration, with vertigo, the two things to be done promptly and thoroughly are: First, to start vigorous elimination by purgative diuretics and diaphoretics, and these failing to relieve in a few hours, second, to drain the middle fossa through the tegmen tympani and antri after doing a radical exenteration of the tympanic cavity and mastoid cells.

We lose valuable time and handicap our profession by waiting for differential points of diagnosis. Undoubtedly intestinal toxemia begins early in all ear disease, and I know of nothing that so completely interferes with peristalsis resulting in obstinate constipation, as does pain in the ear. Here the vicious circle is started, in which we have first constipation followed by faulty and perverted intestinal metabolism, disordered innervation, the urine being loaded with indican, with the result that marked evidence is shown in the toxic condition of the patient. This is no time or occasion for small doses frequently repeated or exploratory punctures; something radical is demanded from both a therapeutic and surgical standpoint. This is an occasion when in the very beginning we

must hasten the results of our efforts, especially from the therapeutic standpoint.

THE INITIAL TREATMENT.

My rule is to start active purgation with one large dose of calomel, five grains for a child under four years of age and ten to twenty grains for those older. Give the full dose not only for its purgative, but for its antiseptic and sedative effect, to be followed in six hours by one ounce of castor-oil, which is to be followed two hours later by one ounce of sulphate of magnesia. If the results of those do not indicate that the alimentary canal is empty and clean, a colon flush is given.

No nourishment is given but milk or broth every three or four hours, and not then if objected to by the patient. This treatment will assist materially in determining whether we are dealing with a meningeal irritation due to toxemia from the ailmentary canal, or whether the chief source of the trouble is elsewhere. In either event, it is the best preparation for any operative procedure that is to follow. If the meningeal symptoms are unmistakable, I do not think it wise to wait for the effect of drugs on the eliminative organs, but give the calomel just before starting the anesthetic and hasten its action as soon afterward as possible.

In several instances where the patient was unconscious and in convulsions, the calomel was given after placing the patient on the operating table, the preparations for the operation being done during the administration of the anesthetic. In five cases where the symptoms of meningeal irritation and brain pressure were most marked and the cases seemed hopeless as far as any treatment was concerned, this procedure of free elimination, drainage and irrigation, resulted in the recovery of three out of the five.

In none of my cases were the meningeal symptoms increased by the operation, and I am convinced that early operation is less dangerous than waiting for an exact diagnosis. Macewen's record of nearly eighty per cent of recoveries in cases operated on for intracranial lesions, stands unparalleled. He, with Jansen, Herman, Heine, Ballance, Körner, Lane, and other well known Europeans, operates at the first evidence of the extension of the infection to the intracranial cavity.

I know of no branch of surgery in which adequate hospital equipment, where trained assistants who are familiar with the technic of the operator counts for more, than in surgery of the cranial cavity. It is here that the "team work" and "system" so prominently brought out by the Mayo brothers are of paramount

value. It is here that the anesthetist, operator, assistant, and nurses, are to understand thoroughly and do his or her part without loss of time or friction. The minimum amount of anesthetic is to be used, and in certain parts of the operation, practically none is given; the minimum amount of laceration and bruising of the soft parts, concussion and jarring done away with by substituting Kerrison's forceps and rongeurs for the chisel and mallet.

The use of the hot physiologic saline solution of a temperature of 115° to 120° F. from a fountain syringe, keeps the field of operation clean, controls hemorrhage and keeps the dura warm and moist, as advocated by Sir Victor Horsley; the careful sponging with gauze wrung out of hot sterile saline solution, to avoid bruising the delicate structures.

In a word, success largely depends on the thoroughness with which the operation is done, with the minimum amount of anesthesia, traumatism and shock, and the most careful sustaining of the eliminative and recuperative powers of the patient. In these cases, an excess of indican in the urine is more to be feared than the presence of small quantities or albumin or sugar, so far as the ultimate results are concerned, and more is acomplished in the first twenty-four hours by giving physiologic saline solution per rectum or by hyperdermoclysis, than by giving milk, broth or any other form of nourishment.

In conclusion I would urge that the key-note of the otologist dealing with intracranial lesions, be: Operate early; and I believe that the otologist is the one to do the intracranial surgery resulting from infection from the ear.

Starr says, "It is an unfortunate fact that less attention has been paid to brain surgery in this country than it merited. Whether this statement is all true, I am not prepared to say. If it is, it is a reproach to American surgeons, but not so great a one as waiting for external evidence of pus formation in the mastoid or alarming evidence of septic absorption or intracranial infection before operating.

Of this, however, I am quite convinced, as I stated at our last annual meeting, that in the domain under consideration, "there is much timber, tall and uncut," much food for thought and labor much anatomic and physiologic work to do, and a still greater field for study in the pathologic realm. Laurels and gratitude await the patient, persevering and courageous investigations of our members as to the diagnosis and treatment of intracranial complications of otitic origin.

A BRIEF CONSIDERATION OF THE PYOGENIC DISEASES OF THE BRAIN OF OTITIC ORIGIN.*

BY JAMES F. MCKERNON, M. D., NEW YORK.

In considering the pyogenic lesions of the brain of otitic origin, I can only give you my own clinical experience in the cases which properly come under this heading. Should there appear in various parts of this paper what might at first seem suggestions foreign to the subject, I can only say that to me they play no small part as etiological factors in its development.

No department of modern surgery has surpassed the advance made in the treatment of the brain complications of otitic origin. This is due to the fact that more accurate observations have been made at the bedside by a closer study of the symptoms presenting, by calling to our aid the laboratory worker and by a careful study and inspection of autopsy specimens. The knowledge thus gained has enabled us to make earlier diagnoses and, by instituting proper surgical procedures, to save a great number of lives.

When we realize that fully 37 per cent of all cases of brain abscess are a direct result of an extension of an infective process from the middle ear and that of this number more than four-fifths are caused by a middle-ear suppuration, it is not difficult to comprehend how important it is to treat this condition in order that structures adjacent to the middle ear may not become involved.

This is one of the special etiological factors in the production of brain lesions of otitic origin, of which I wish to speak more fully.

When a patient consults his physician about an otorrhea of long standing, the doctor is very apt to instruct him to syringe his ear with some kind of antiseptic solution two, three, or four times a day, as the case may be, without even having examined the canal and middle ear to discover to what cause the discharge may be due. Or again the patient or the patient's parents—if the patient be a child—are told that it is a good thing for the ear to discharge, and that nothing must be done to prevent it, as it is nature's method of ridding the system of an impurity, and that when the discharge ceases the ear will be cured. Unfortunately, it all too frequently happens that when such a discharge does cease, it is because the

*Read by invitation at the 13th Annual Meeting of the Academy of Ophthalmology and Oto-Laryngology, at Louisville, Ky., September 26th, 1907.

drainage from the middle ear has become obstructed and the pus that was making its appearance at the meatus has been diverted into another channel and is already affecting the mastoid bone or one or more of the intracranial structures. It is the physician's first duty when consulted by these patients to determine whether or not a necrotic process is present in the middle ear as the cause of such a discharge, and if upon examination dead bone be found, the patient or his parents should be apprised of the risk he runs if this process is left to continue unchecked. It is much wiser if the patient be made to accept the responsibility of the future outcome of the case, provided operation is advised, and refused, than that the physician be censured later for not having communicated the fact to him. It is not a difficult matter for the family physician to make these aural examinations when first consulted by these patients, and if this is done the future of many a patient will be placed on a comparatively safer plan than when it is omitted.

To demonstrate how an infective process can travel from the middle ear and affect other structures, I show you a temporal bone in which such a process has occurred which beautifully illustrates the pathway of infection from the middle ear to the mastoid antrum by way of nature's channel, the aditus ad antrum. From this central mastoid cell, a further infection takes place through its roof, affecting the dura at this point, and subsequently affecting the cerebral substance adjacent to it, so that suppuration takes place, and we finally have a brain abscess formed which is connected indirectly with the middle ear from which the suppurative process originated.

In this section of the temporal bone which I here show you, the infection has traveled a much shorter route, namely, through the roof of the tympanum, or tegmen typani, as it is called, and the dura lining the inner surface of this bone became involved, and later an extension of the trouble was communicated to the brain substance in this region.

It is in adults that we usually find the infection in this locality, caused, no doubt, by the long-continued suppuration so closely adjacent in the middle ear cavity. The first route of infection described is the one usually occurring in children and young adults, the reason for this being that so many times in children the mastoid becomes involved in a suppurative process complicating either an acute otitis or an acute exacerbation of a chronic purulent condition which is not recognized, or if so, not opened, thereby allow-

ing the poisonous element to remain in the mastoid antrum, where it subsequently creates trouble by a process of extension through the bone and dura to the cerebral substance.

Frequently nature by her most beneficent action prevents an extension of the infection to the brain substance itself by granulations forming on the bone surface of the dura and causing hypertrophic changes in its structure, and walling off for a time at least a further inroad of the infection. Such a condition is called a pachymeningitis, and explains the cause of the persistent localized headaches of which these patients constantly complain.

A collection of pus is very frequently found in contact with the dura in this region, and when present is referred to as an epidural abscess. As an illustration of this attempt of nature to protect the brain substance from injury, I show you a section of a skull with a perforation through the inner table and a markedly thickened dura that protected the cerebral substance which it covers, and the brain within was found upon autopsy to be involved. Several years ago, and in fact until within the last decade, many of the causes of the so-called meningitis owed their origin to just such an infective process as the one described.

Another form of brain disease with which we frequently meet as a complication of either acute or middle ear disease is an inflammation of the cerebral substance itself, and is called encephalitis. It usually occurs following an operation for the removal of an extensive necrosis where a large area of dura has been exposed, as in an obliteration of the sigmoid sinus, and the favorite site is the cerebellar tissue. This condition was formerly said to be caused by an infection at the time of the operation, as the time of its appearance was usually some four or five days following the dural exposure. I do not believe this to be so, but think the cause of infection is carried through the veins from the dura to the cerebellar tissues within, as the poisonous substance is doubtless already in the thickened dural veins and manipulation and irritation of this structure at the time of operation serves only to disseminate it to the brain substance beneath, causing an encephalitis, with usually a fatal result.

Another prolific cause in the past for the development of an intra-cranial infection, or for the permanent loss of audition, or both, was the practice formerly so much in vogue, of doing a so-called Wilde's incision in cases of subperiosteal abscess in children, and expecting that nature would complete the cure. Many of these

cases when so treated continued to discharge through the opening made, until a permanent fistula was established, carrying constantly from its source (the infected mastoid process) the products of decay. If later this fistulous tract became obstructed the pus usually found its way through a channel of lesser resistance, namely, the inner plate of the temporal bone, which had become diseased through a long and continuous contact with the suppurative process, thus establishing an intra-cranial infection months, and even years, after such an incision had been made. In the few instances where no permanent fistulous tract was left and the tissue healed, there was still left a discharging ear which later became chronic in character, and in this way jeopardized the future safety of the patient.

When we have a case before us which presents all the physical signs of a subperiosteal accumulation of pus, it should always be evacuated under anaesthesia. But we should not stop with the simple evacuation of the external abscess. We must proceed further and, opening the mastoid process, remove the disease already there, as the external manifestation of pus in the vast majority of cases is secondary to a primary mastoiditis. There are a few cases met with which are an exception to this rule. They are very young children, and in these the pus burrows up from the middle ear, external to the mastoid, and finds its way beneath the periosteum usually at the petro-squamous suture. But even if the latter condition does exist, it is always safer for the future of our patients to explore the mastoid and thus prevent the possibility of any subsequent invasion occurring later.

In a personal experience of 162 cases of subperiosteal abscess operated upon, in children whose ages ran from five weeks to eight years, pus was found in the mastoid process in 158 of the cases. In the four children where the pus was absent, there was a large amount of granulation tissue and softened bone found; so that I believe it is very unwise to merely evacuate the subperiosteal accumulation and hope that nature will come to our aid and complete a cure which should have been accomplished by the surgeon.

Another phase of what may properly be called otitic brain disease is a thrombus, complete or partial, of the whole or any part of the sigmoid or lateral sinus or adjacent blood currents, and occurs as the result of either an acute or chronic suppuration of the middle ear, although it is more frequently associated as a complication of a chronic purulent condition. It does, however, complicate acute cases,

and when it does, the infection is usually of a virulent type. The symptoms are recognized to-day as somewhat more complicated than formerly, this complexity being due to the fact that there are classes of cases differing very materially, symptomatically speaking, from the type known as typical, so that at the present time we are enabled to classify the symptoms as belonging to a certain group of cases, which, combined with our clinical experience, places at the disposal of the practical otologist a group of fairly definite symptoms from which to make a positive diagnosis of the disease.

*In reviewing the symptomatology of this disease, I shall follow the lines of my personal experience and do so under three heads. First, the symptomatology in the typical cases; second, in the atypical cases; and, third, in those where the bulb and sinus are primarily involved without macroscopic disease of the mastoid process. As the majority of those cases coming under our observation are those secondary to a mastoid involvement, or developing after the mastoid operation has been done, there are a few definite symptoms present which are fairly constant and which enable us without delay to recognize this condition.

SYMPTOMATOLOGY. *Temperature*: The symptom which I consider by far the most important is that of temperature and depends upon the amount of septic material entering the general circulation which, if it be large in amount, is at once followed by a rise from the normal to 104°, 105°, 106° F, and many times higher, and this is quickly followed by a remission to near the normal point or below. There may be only one rise during a period of twenty-four hours, or several may take place, depending upon the rapidity and the quantity with which the poison is entering the general circulation. If the patient be kept under observation for several days, these exacerbations of temperature become more frequent and the variations greater.

Chills: They are present in only a portion of the cases seen, possibly fifty per cent., and I am inclined to believe that this is high. When present they usually precede the rise in temperature, and in some patients are followed by profuse sweating. Many of the cases coming under our observation exhibit no definite chill, they merely complain of a slight chilly sensation, and frequently this is overlooked unless the nurse in attendance is on her guard and watching for such a manifestation. In a post-operative mastoid case with frequent variations of temperature, these slight chilly sen-

*Abstract from a paper read before the Section on Otology of the American Medical Association, at Atlantic City, N. J., June, 1907.

sations are quite as important as though a decided rigor were present. In a communication before the American Otological Society in July, 1899, particular stress was laid upon this point, and during the intervening years at least one-third of all the cases observed has borne out the importance of watching for this but infrequently spoken of symptom.

Pulse: In case of phlebitis, when there is a sudden high elevation of temperature, there is a corresponding rapidity of the pulse rate, ranging from 120 to 150 per minute. In cases exhibiting a lower temperature range, the pulse is often between 100 and 130, and when the existing phlebitis is complicated by a collection of pus in the brain, it is much slower.

Respiration: In many of the cases of phlebitis, the respiratory changes are but slight, but increase during the hyperpyrexia, at times becoming as rapid as forty or fifty a minute. This is especially noticeable in the younger patients.

Pain: In many cases of phlebitis coming under our observation, the degree is greater than that present when only an ordinary mastoiditis exists, or than that subsequent to a post-operative case. The pain is usually referred to the side of the head and to the occipital region, and is many times localized in the region of the torcular. In a few cases where the internal jugular vein becomes infected early, there is decided pain in the neck along its course, and occasionally this pain will radiate down over the chest of the affected side. In many of the cases the pain present in the neck is caused, I believe, by an infected chain of lymphatic glands, rather than by any obstruction in the vein.

Nausea and Vomiting: These symptoms are usually present at some stage of the disease in a moderate or pronounced degree. They usually complain of nausea first, particularly on being aroused, or moving the head. This may be followed by slight vomiting, which later becomes more pronounced after the drinking of fluids. It may however, occur at any time independently of the taking of solids or fluids, and the amount is usually small.

Intra-ocular Symptoms: In only about one-third of the cases coming under my observation, have eye symptoms been present. This may be due to the fact that many of the cases were seen and operated upon early. Had they been left until a later period of the disease, intra-ocular changes might have taken place. In a small number of the cases, when the phlebitis has extended to the cavern-

ous sinus, there is pronounced swelling and puffiness of the eye and lid on the affected side.

Vertigo: I have observed its presence only in those cases of long standing purulent middle ear involvment, or where the meninges were affected.

Cerebration: This has invariably been normal except in advanced cases. While some of the patients are drowsy and do not wish to be disturbed, yet they answer questions intelligently when aroused. If, however, the disease be allowed to progress, this drowsiness increases, and is followed by evidences of impaired cerebration.

Physical Signs: We occasionally find the presence of oedema in the mastoid region, and oedema over and around the exit of the emissary and occipital veins. In some of the well-advanced cases, both in adults and children, there is a marked stiffness of the muscles of the neck on the affected side, and the head of the patient is drawn well over toward the shoulder of this side, showing a marked torticollis, as it were. Combined with this, there is a well marked rigidity of the muscles present. A physical sign which the books tell us to look for in phlebitis of the vein, is a hard cord like swelling in the neck. While unquestionably such a physical sign does occur, in the experience of the writer, it is very infrequent, and only present in cases far advanced in the disease. I have never been able to demonstrate such a condition but once, though I have tried to do so repeatedly before operation.

In cases well advanced in the disease, metastatic deposits may occur in any joint of the body, either single or multiple, closely adjacent to or remote from the original focus of infection.

General Symptoms: Among these may be mentionel loss of appetite, a dry and heavily furred tongue, and a foul breath. The face is anxious; there is a pallid look; the skin is dry, and later presents a yellowish tinge indicative of sepsis.

ATYPICAL CASES.

These are cases invariably following a mastoid operation which usually do well for a few days after the mastoid has been opened. Then the patient becomes restless, irritable, and disinclined to take food. The tongue which before was clean and free from any coating, becomes dry around the edges, and presents a whitish glazed appearance in the center. The pulse increases from 100 to 130 or 140 a minute, and there is a slow gradual rise in the temperature to 103°, 104°, 105° F, or higher, remaining so for several days. In some of the cases it will not vary a degree in twenty-four to forty-eight hours, while in others there is a little more vari-

ation, but there are no sudden drops, and no sudden rises. The patients complain of headache and occasionally of nausea, but few reach the vomiting stage. They are unable to sleep for any considerable period of time, and if surgical measures are not instituted, they later show all the signs of pyaemia. There is no chill or chilly sensation present, cerebration is clear, the only evidence of any mental disturbance being an occasional irritability of temper, and this is especially noticeable when they are first aroused. Later they become exceedingly drowsy, and the skin begins to take on a yellowish hue, and there is profuse sweating.

Physical Signs: A physical sign which I consider of the utmost importance in this class of cases is that when we inspect the mastoid wound in the early stages of the disease, we find every portion of it apparently doing well and covered with granulations except one point, and this point is the bone forming the sigmoid groove. We will find the bone in this region darker in color than when it was first exposed at the time of the operation, and there will be no granulations found upon any part of it. In other words, we have a mastoid cavity showing all the evidence of healing except the bone over the sigmoid sinus. Should the infection progress farther and be allowed to go unchecked, we will find in three or four days that the mastoid wound would present an altogether different picture. The parts that were formerly covered with healthy firm granulations have now become pale and flabby, with a tendency to soften and break down, while the bone over the sinus still remains dark in color, perfectly dry, and devoid of all reparative process. If during the mastoid operation the sinus was exposed, we find at this stage the dura covering it presents a whitish or gray appearance, devoid of lustre, and at times covered with a plastic exudate. If pressure be brought upon this exposed area of the sinus, it will be found easily compressible.

BULB AND SINUS PRIMARILY INVOLVED.

*In this third class of cases, there is an acute purulent otitis present with the usual symptoms found accompanying this condition in an aggravated form, and the subsequent symptoms detailed are, I believe, the result of a direct infection from the tympanic cavity to the blood current closely adjacent, namely through the floor of the tympanum to the jugular bulb. The explanation of the possibility

*Abstract from paper read before the American Otological Society at Boston, Mass., May 9th and 10th, 1905.

Primary Bulb Case.

NAME.

DISEASE Jessie B.

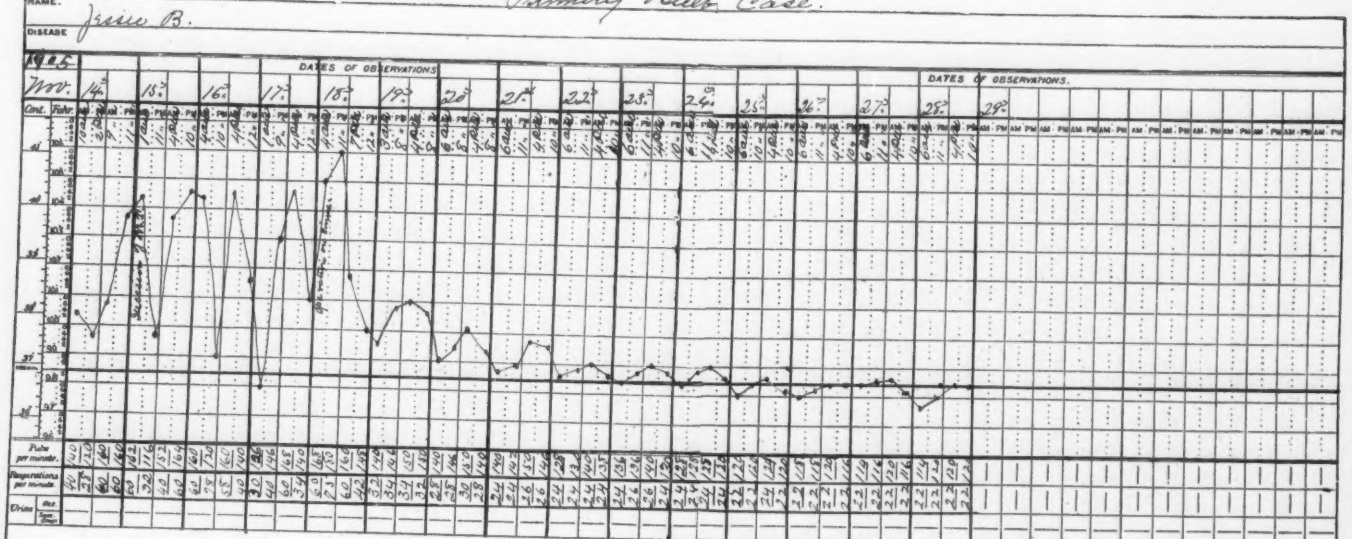
1905

Nov.

DATES OF OBSERVATIONS

14th 15th 16th 17th 18th 19th 20th 21st 22nd 23rd 24th 25th 26th 27th 28th 29th

Cent. Fahr.



Pulse per minute.

Respirations per minute.

Urine oz. Sp. Gr.

of this is quite clear if we bear in mind the fact that in a certain percentage of the skulls examined we find an unusually high dome encroaching upon the middle ear cavity, or a dehiscence may exist in this region. Under such conditions as these, it can readily be seen how an active purulent infection of the middle ear cavity can affect the blood current without first having to travel its usual course through the venus structure of the mastoid bone, the pathway of infection being through the small communicating veins and lymphatics, or by a process of absorption directly through the thin wall of bone in this region.

The symptom in these cases of greatest importance is an unusually rapid rise in temperature (see chart) from 99° or 100°, to 104°, 105° or 106° F, and quite as sudden as the rise, a fall to 97°, 98° or 99° or possibly 100° F.

The temperature may remain low for several hours, and then quickly rise again to the points first mentioned, to be followed by a remission, and this may go on indefinitely until the end. During the exacerbations of temperature the pulse is rapid, ranging from 120 to 170 per minute. There is no chill present. The only evidence of one found in these patients is, that if seen when the temperature begins to rise, they will be found to have cold hands and feet. They are exceedingly fretful and irritable, and later become drowsy. The eye signs are negative. If the temperature range is allowed to repeat itself for several days, the tongue becomes white and dry. During the temperature remissions these patients—and they are usually young children—feel remarkably well, will ask for food and ask to sit up and play with their toys. This is one of the phases of the disease which the parents and the uninitiated find hard to comprehend. They see such an apparent improvement in the little ones that they are misled as to the dangers existing, and often believe they are well on the road to recovery, until the next rise of temperature occurs.

Take for example the symptoms as recognized to-day in a typical case of this disease. Briefly, they are the presence or the history of a purulent discharge from the middle ear, with a sudden rise of temperature, say from 99° or 100°, to 105° or 106° F, with a rapid remission, and this proceeded by a chill, or a chilly sensation, occasional nausea or vomiting and more or less irritability of temper, with drowsiness. These are quite sufficient to notify the otologist that the patient's condition is not satisfactory. Should these symptoms be repeated in a few hours, there is evidence enough to war-

rant the exposure and exploration of the various portions of the sinus by the aurist.

In no branch of aural surgery to-day have more brilliant successes been made, than in the early recognition and operative treatment of this disease. Contrast this with the older methods of treatment—I shall not say recognition—for such a condition was not recognized a few years ago, where the cases were treated for almost every disease in the category until the meninges became affected, or died from general sepsis or pyaemia, even though the cause in the majority of cases was not even dreamed of. Even to-day, many of these cases are treated for that much maligned disease, malaria, and later when a general sepsis has occurred, if recognized, it is too late to save the patient's life by any operative procedures.

There is a phase of this disease that I wish to call particular attention to because it is so misleading and unreliable. I refer to that stage of it which is present in the majority of the cases during the temperature remissions, namely: we have often been mislead by the patient's apparent improvement at this stage, and during the earlier years of observation it was a most difficult and sometimes impossible matter to understand why, if the patient had such a serious condition present, he should apparently feel so well between the exacerbations of temperature. A closer study of the cases as presented subsequently, taught us that this could be explained by the fact that the rise in temperature is caused by some of the infective material in the sinus being carried into the internal jugular vein, and disseminated through the body, thus causing a systemic poisoning. When this occurs, we observe the chill, temperature, nausea, vomiting and marked drowsiness, with other symptoms of minor importance. But when the general system has eliminated this poison, or the major portion of it, we find our patients feeling brighter, more cheerful and inclined to be optimistic, as though they were far from any danger, when in reality the danger is just as eminent if not more so than before, for the symptoms enumerated recur again and again if the patient be left without surgical aid until such time that operative procedure, even though it be resorted to, is too late to save life.

Many of us can, I think, indulge in a retrospect, and recall case after case of so-called idiopathic meningitis and general pyaemia that resulted fatally, when had the true cause been known we would have recognized the middle cavity as the starting point of it.

Diagnosis: The first class of cases is easily recognized, our diag-

nosis being based upon the temperature changes and the presence of a chill or chilly sensation preceding the rise in temperature, and following an operation on the mastoid. If most of the symptoms given in this case be present, it is of course comparatively easy to make a diagnosis, but if several are absent, the diagnosis can be made from the temperature changes with the chill, or chilly sensations that are present. In those cases where the sinus is operated upon at the same time that a mastoid operation is done, and we have no previous symptoms to guide us as to its involvement, we determine whether or not it is necessary to open the sinus at that time by the presence of a necrotic area of bone over and around the sinus, with usually an epidural collection of pus, commonly called a peri-sinus abscess. The dura covering the sinus wall is at times thicker than normal, and darker in color, or it may present a lustreless appearance, darker at one point than another, and usually the lower end toward the bulb is a whitish or gray color. At times there is a grayish plastic exudate adherent to the sinus wall, and the sinus looks flat and does not present a rounded appearance when divested of its bony covering, is easily compressible, and does not fill quickly when pressure is removed.

In the absence of previous symptoms referable to sinus involvement, the presence of an epidural or a peri-sinus abscess is not a positive indication for opening the sinus. It is only when the physical signs described above are present with or without the epidural collection of pus. Nor should the sinus be molested if the dura covering it be protected by granulation tissue, for this is an effort of nature to combat the progress of the disease.

Bacteriological examination of the discharge from the ear is of value in certain cases, as when the bacillus of Friedlander is found, the infection is prone to greater activity, travels more rapidly, and the sinus and veins are involved earlier than in many of the other forms of infection. Another valuable aid in diagnosis is the differential blood count,—not so much for determining if a leucocytosis is present, as to determine the polynuclear percentage. With a percentage of over 75, no matter what the leucocyte count be, whether great or small, we are almost certain to find an infective process which calls for surgical intervention. The leucocyte count is of value only in giving us information as to the patient's resistance to the disease.

An important point to be borne in mind in connection with the differential blood count is, that the polynuclear percentage is not as

high when pus is present in bone cavities, as when it is in the soft tissues of the body. Take for example an ordinary pus infection of the mastoid bone free of complications. Here the differential count will show say from 70 to 80 per cent of polynuclear cells, and many will tell us that such a low percentage precludes the possibility of pus being present, which is not so. The explanation being that we have a bony cavity to deal with, containing pus that is undergoing little systemic absorption. But, complicate such a bony cavity by an involvement of an adjacent blood current, and there will be a rapid increase in the polynuclear cells from 85 to 95 per cent and even higher.

In the second, or atypical class, occurring as they do some days after a primary operation on the mastoid, the diagnosis is made on the temperature changes, and the patient's general condition. Take, for example, a case of mastoiditis that has been operated upon say four to twelve days previously, the temperature during this interval following the usual course of a typical post-operative mastoid case. On the next day when we see the patient we find him a little restless, appetite which before was good, variable, the tongue beginning to become coated, the pulse, which the day before ranged between 70 and 80 is now between 90 and 100, and the temperature that was normal has risen to 99.6° or 100.6° F or thereabouts. The next day the temperature will be from one to two degrees higher, with no marked remissions; the patient's general condition has changed somewhat, the restlessness is more pronounced, there is a distinct irritability, and he is disinclined to take food. The tongue has become dry around the edge, with a thicker coating than the previous day, the pulse has increased in rapidity from 110 to 120 per minute. He complains of headache, not localized, but general, and an occasional feeling of nausea, and is unable to sleep for any considerable period of time. When seen the following day the temperature has gradually risen to 104° F or higher, the pulse is now running from 120 to 140 per minute, and shows a diminution in tension. The headache is more pronounced, and the restlessness, sleeplessness and irritability are prominent features which cannot fail of recognition. The white or grayish coating on the tongue has now changed, and is brown and dry like leather, and has a glazed center. If the disease is allowed to progress without efforts to combat it, we find within the next twenty-four hours that the temperature has risen to 105° F or even higher. The pulse has become more rapid, 140 to 150 per minute, showing less volume and becoming weaker, and

Atypical

NAME. George C.

DISEASE

1907

DATES OF OBSERVATIONS.

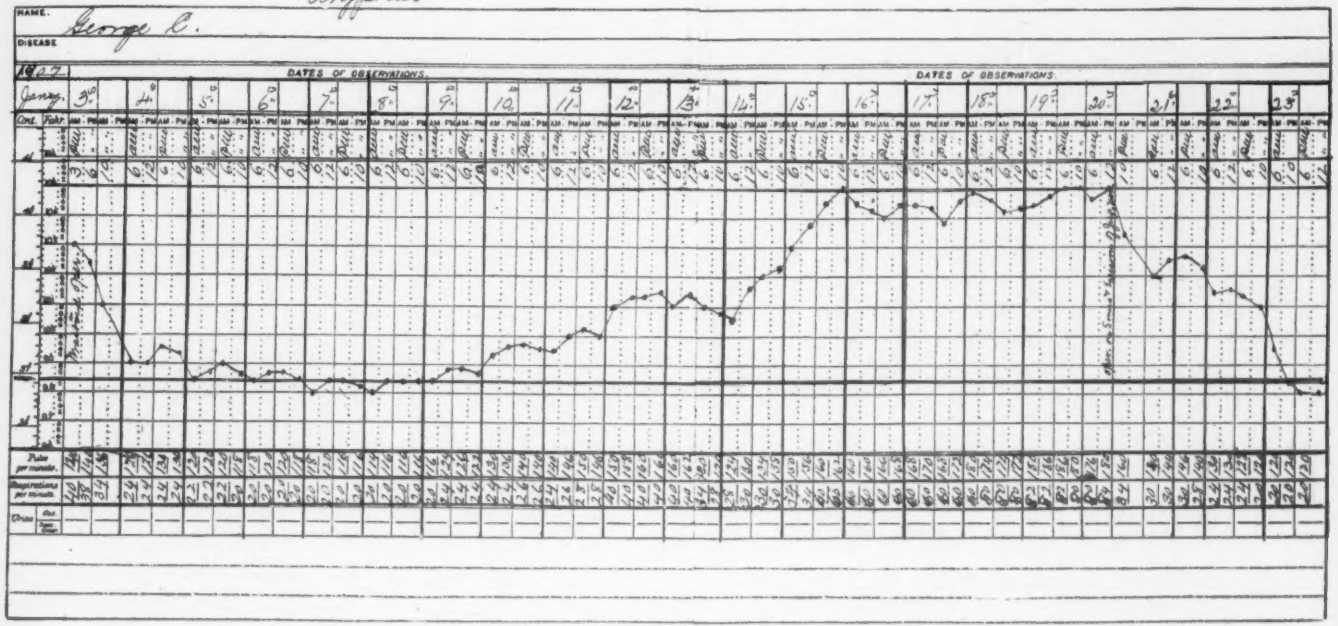
Jany. 3d 4th 5th 6th 7th 8th 9th 10th 11th 12th 13th 14th 15th 16th 17th 18th 19th 20th 21st 22nd 23rd

Cent. Fahr.

Pulse per minute.

Respirations per minute.

Drugs



coincident with this is a refusal to partake of food. At this stage they become drowsy and exceedingly irritable when aroused, and wish to be let alone. As the disease progresses the temperature will practically remain stationary, with no marked remissions. (See chart.) The pulse gradually becomes weaker, and we have all the evidence of a general pyaemia present.

A very valuable aid in diagnosis to us in this class of sinus disease is the physical sign spoken of earlier in this paper, namely the absence of granulations over the inner table covering the thrombosed area, and its change in color from normal to dark. Another physical sign which aids us is this: if the sinus was exposed at the time of the mastoid operation, we will find that the dura covering it has undergone a marked pathological change, as it presents a grayish appearance, is lustreless and covered with a plastic exudate and the vessel itself looks flat.

In the third class of cases, namely, when the bulb and sinus are primarily involved, the diagnosis is made almost entirely from the rapid excursions of temperature, closely following an acute purulent otitis. Bacteriological examination of the discharge from the ear is of value here as in other cases. The same is true of the different blood count, and the utmost importance should be attached to it when the polynuclear proportion is found to be between 85 and 95 per cent, as I believe this is a positive evidence that the patient is suffering from an acute septic process. As a still further aid in diagnosis, all other diseases should be ruled out by a process of elimination before operation is decided upon.

Treatment: While it is beyond the scope of such a paper as this to go into the details of treatment for such a condition, it may not be amiss to mention a few points in the technique. In dealing with this complication the treatment of the sinus will be spoken of first, and secondly, that of the vein when involved.

In this disease, as in many other surgical cases, each individual case is a law unto itself, and proceedings should be instituted as seem best to us at the time we are dealing with it. The first step is a complete and thorough exposure of the sinus from a point above the bend or knee down to the region of the bulb, followed by a flushing of the operative field with a hot saline solution, and then by absolute alcohol to insure sterilization before opening the vessel.

The treatment in the first and second classes of cases does not materially differ. Too much bone should not be removed posteriorly,

so as to uncover a large dural area over the cerebellum, as it is in that region that a hernia is liable to occur rather than at other points, and its occurrence is usually invited when considerable of the bony covering posterior to the sinus has been removed. After the sinus has been exposed, a small piece of iodoform gauze should be rolled up and placed over the upper end of the exposed sinus, and pressed firmly under the edge of the bony groove, so as to cut off the circulation in the vessel, should it be present. A similar piece of gauze should now be placed over the sinus in the region of the bulb and pressure exerted here, after which the dura forming the anterior sinus wall should be incised freely with a scapel or scissors between these points, and the contents of the sinus evacuated. The reason for abandoning the use of the aspirating needle as a diagnostic aid in these cases is because many times a thrombosed sinus might contain a small clot, while the remainder of the vessel would be filled with fluid blood, and unless the point of the needle engaged the clot, fluid blood would be drawn into the syringe, thus giving a wrong impression of the condition existing within. Or a small parietal clot might be present and the needle would pierce this clot and then be passed further into the lumen of the vessel, and draw blood into the barrel of the syringe. Whereas, if we use a scalpel or scissors to open the sinus, and a free incision is made, if the clot is a small one it is washed out through the opening by the blood pressure from within. Should we be unable to obtain a flow of blood from the distal end of the sinus after the pressure has been removed in this region by taking the roll of gauze away, then we should make a further exposure in this region, and proceed backward as far as the torcular if necessary, provided we do not secure a free return flow of blood before reaching it, for if we do not obtain a blood current in this region sufficiently free to show that all obstruction has been removed, our patients do badly subsequently, either from an extension of the infective process to the blood channels, or the development of an encephalitis one or two weeks later, caused by an extension of the infection we have overlooked in this region.

When a thrombus is removed and the blood flow established from the proximal end, hemorrhage should be allowed to continue for a few seconds so as to remove any small clot or septic material that may be present further back in the vessel. This hemorrhage is then easily controlled by packing a small piece of folded gauze directly against the opening of the vessel.

The lower portion of the sinus is proceeded with in the same manner. After the removal of the clot, and whenever pus and broken down material may be present, an attempt should be made to restore the circulation at the bulb. In about half the number of uncomplicated cases coming under our observation, this can be done quite easily, but in others it becomes impossible without dangerous manipulation. By this I mean if very much time or effort be consumed by our attempt to restore the return circulation at the bulb, we run the chance of dislodging some foci of septic material from the bulb and having it thrown at once into the general circulation, thus increasing our systemic poisoning. In cases where the sinus does not contain pus, and the symptoms presenting do not show the evidence of a jugular involvement, it is better to cease our manipulations, even though a return current of blood be not established. Cleanse the operative field, and pack the sinus firmly at the bulb with gauze rather than proceed any further, as experience teaches us that a large number of these cases recover without resort to further surgical procedure. This is especially true of the cases that are operated on early, before marked systemic symptoms have developed, and before the coats of the vein below have become infected with the micro-organisms of the disease. In all of these cases encountered, whether of the septic or non-septic variety, we should thoroughly expose the lower end of the sinus at the bulb, as here quite frequently is found the clot, and not above, owing to its close proximity to the floor of the tympanic cavity, and this is especially true when we have a large jugular bulb to deal with.

Care should be taken to excise all sloughing edges of dura, for if left untouched after the sinus has been incised they will retard the healing process. When pressure has been removed from the bulbous portion of the sinus, we at times encounter a free return flow of blood, but whether the source of such a hemorrhage be from the internal jugular vein, or from the inferior petrosal sinus, we are unable to say, for it is as likely to come from the sinus as from the vein. But when such a free return flow is present, and the sinus above contained upon opening it, a parietal or firm and non-disintegrated clot, we usually end the operation here and await further developments. If, upon the other hand, we find upon exploring the sinus, pus or a disintegrated clot present, or both, we should desist from any further manipulation above, protect our already exposed field of operation, and proceed at once to expose, ligate and resect the internal jugular vein from a point below at the clavicle,

to its exit from the skull. Should any of its tributaries be found involved, they should also be ligated and resected well beyond any point of macroscopic involvement. All diseased glands exposed during the resection of the vein should be removed. After this has been accomplished, the contents of the sinus should be evacuated in the manner spoken of earlier in this paper. When such a procedure as this is carried out, it usually prevents the possibility of any further infection being thrown into the general circulation through the medium of this vessel. To be sure, a still further infection may take place after the vein has been resected, through the medium of the anterior and posterior condyloid veins, or the occipital and petrosal sinuses.

In many of the cases where the vein has been removed primarily, before the evacuation of the sinus contents from above, we find that the return of blood from the region of the bulb is quite free, as we would expect to find it if we had the internal jugular vein carrying on its usual function, the blood coming, no doubt, from the inferior petrosal sinus. This is a valuable point to be remembered, for many operators will tell us, that when we succeed in obtaining free hemorrhage from this end of the sinus, it shows that the vein below is uncomplicated and is performing the function for which it is created, that of transmitting an obstructed current of blood back to the heart, when, in reality, there is not a drop of blood present which has its source from the vein below. I have seen this demonstrated several times when the internal jugular vein was ligated and resected as a preliminary to exploring the sinus above. Occasionally, after the vein has been removed, we are unable to obtain a return flow from the bulb, which means that the inferior petrosal sinus is involved, and when such a condition confronts us (which fortunately is not frequent) we should, provided the patient's general condition will allow it, expose this sinus and remove the obstruction, as otherwise we are unmindful of the best interests of our patient by allowing an infective process to remain, which may at any time cause trouble. Should the superior petrosal sinus be involved, it should be exposed and treated in a like manner.

When the internal jugular vein is removed, the treatment of the neck wound is optional, either by the open method with packing and later drawing together by straps, or suturing at the time of operation, and inserting a large cigarette drain. I prefer this latter method with wet saline dressings changed every twenty-four hours, and each time the dressing is reapplied, a small portion of the drain

removed, so that at the end of the fourth or fifth dressing the drain has been entirely removed, and primary union accomplished in the majority of cases.

In the primary bulb and sinus cases—the patients being nearly all young children—it would seem that the treatment should be the same as in the other cases, but here we must remember that when these cases are caused by a primary infection of the blood current, and when operated upon early, the percentage of recoveries is in favor of removing the clot without ligating the vein, for the young patients do not bear prolonged operations well, and it is a matter of greater difficulty to ligate and resect the internal jugular vein in a young child than it is in an adult, for we have to deal with a neck that is short and chubby, encountering usually a number of enlarged glands, which prolong the operation many times beyond the safety point. If subsequent ligation becomes necessary, it can be done rapidly, and the young children need not be subjected to the added risk of a prolonged operation.

It must be borne in mind, that in this class of cases, when a free hemorrhage is obtained from below, we can never be sure that all of the infective material has been removed, for it is impossible to pass a curette from above into the bulb, and in all probability a larger number of our cases operated upon without ligation of the vein, have some infective material left in the region, but not in such quantity that the system cannot care for it by a process of elimination. There is a type of cases in young children to which strong exception must be taken to the conservative method of treatment. I refer to those cases, when, upon opening the sinus, pus, or a broken down clot be found. When such a condition as this confronts us, whether there be a free hemorrhage at the bulb or not, I believe it is imperative for the safety of our patient, that the vein be removed at once, and not wait for a train of symptoms that are too well known, and unfortunately, usually fatal to the patient.

There are many post-operative mastoid cases that fail to progress favorably, showing many or all of the so-called positive signs of sinus infection. And yet, when these cases are operated upon subsequently, and the sinus explored, no clot can be demonstrated, although from the moment the sinus is opened and a free hemorrhage takes place, the patient begins to improve, and an ultimate recovery follows.

What is the explanation of this? Simply that we have a small parietal or central thrombus to deal with, and when the sinus wall

was freely incised there was a sudden gush of blood outward, which carried the clot with it. Many times careful search will reveal such a thrombus adherent to the towels surrounding the operative field, or to the gauze that has been used in sponging.

In our septic cases when after operation the patient does not progress as favorably as we think he should—the temperature remaining high, with only a partial subsidence of the general symptoms, and where we are doubtful whether any further operative procedure is demanded, it is wise to wait for a time before any other radical measures are taken. For we must remember the fact that we are dealing with a septic case which took several days to develop, and that there was a gradual absorption into the system of a virulent poison, and that the post-operative history of such a case would show the slow elimination of the poisonous element absorbed, even though the source from which the infection emanated had been removed.

Before leaving this important subject, I cannot too strongly urge the necessity for an early operative procedure. We should not procrastinate until the infective material so thoroughly permeates the system that all possible chance to save the patient's life is gone. The most favorable time for these patients to be operated upon is during the temperature remissions, for, if done then, they bear the shock of operation much better, and react more favorably than if operated upon during an exacerbation of the temperature. This point has been well demonstrated in prolonged operation, as in the resection of the vein, and the removal of the infected glands following the mastoid operation.

Pachy-Meningitis. One of the most frequent of the pyogenic infections arising from middle ear suppuration is pachy-meningitis, a condition very frequently found complicating mastoiditis. When present, the one prominent symptom always complained of by the patients is persistent and localized pain over the site of the pus accumulation. This with marked tenderness upon pressure over the bone may constitute the only prominent sign that is present.

The treatment of this condition is a free exposure of the dura and the removal of all necrotic bone adjacent to it, but care should be taken not to separate the adhesions between the skull and dura, which demonstrates nature's effort to localize the process.

Lepto-Meningitis. In former years when a lepto-meningitis followed a middle ear suppuration, it was invariably fatal, because the infected area was seldom, if ever, exposed, cleansed and drained.

Or, if such a procedure was carried out, it was only after the patient's condition had become so serious that it would have been wiser not to have operated, the vitality being at such a low ebb that death followed quickly. It was left to the brilliant surgery of Macuen to early recognize and expose these infected areas, and institute proper surgical methods for their relief and cure, and today a goodly number of these cases are saved by the treatment advised, and first practised by this eminent surgeon.

Time does not permit of even a brief abstract of the symptomatology and diagnosis of this most important intra-cranial lesion. One point, however, may be mentioned that is an aid to us now in the diagnosis, as well as the treatment. I refer to lumbar puncture, for by the examination of the spinal fluid we are now able to make an earlier diagnosis, as well as relieve some of the most distressing symptoms by drawing off a considerable quantity of cerebro-spinal fluid, thus relieving pressure, and in some instances in severe cases, prolonging life.

Brain Abscess. This complication of purulent otitis is often very difficult of recognition because of the complexity of symptoms that may be present, a part of which may be due to other intra-cranial conditions than that of the abscess, and for this reason a positive diagnosis is impossible in many of the cases. In cerebral abscess, the symptoms presented in those cases observed by the writer are briefly as follows:

Symptoms. The presence or history of a purulent discharge from the ear of the affected side, persistent and localized head pain, tenderness on percussion, fretfulness, followed later by irritability, moaning, crying out in sleep, and in many, gritting of teeth, insomnia, nausea with vomiting, drowsiness with intolerance of light, aphasia, depending on location of the pus collection, and vertigo well marked in some cases. The nerve manifestations in the majority of cases have been of but little help in arriving at a diagnosis. Intra-ocular changes when present are valuable aids, but by no means positive. The pulse is slow, from 48 to 65, in cases uncomplicated by other intra-cranial affections, and when complicated it is much higher and very misleading. The temperature in an uncomplicated case is low, ranging from subnormal to a little over a hundred. But in many cases of the acute type the lesion is coincident with one or more complications, and here the temperature is much higher, and again misleading.

Diagnosis. The diagnosis is usually made on a majority of the symptoms enumerated, the differential blood count aiding us very materially. In the abscess of acute origin, before a limiting membrane has had sufficient time to become organized, there will be a greater amount of absorption, and with this a correspondingly higher polynuclear percentage ranging from 85 to 96 per cent. If the abscess is of the chronic variety from an old purulent condition of the middle ear, and of itself of long standing, the polynuclear percentage will be considerably lower, owing to the fact that there is but little systemic absorption occurring, because the surrounding brain tissue is protected by a more or less dense limiting membrane.

Another aid which may be of more value to us in the future than now is a radiograph of the cranial contents. In one case it has been of help to the writer. It has, however, been used so seldom that as yet no definite value can be attributed to it. It is to be hoped, however, that in the near future an improved technique may increase its value to us in this line of investigation.

Cerebellar Abscess. A collection of pus in this region may remain unrecognized and give but little trouble for years, this being especially true if the accumulation be small, with well formed walls. But if situated deeply the lack of co-ordination on the part of the patient makes us suspect at once that we have a lesion of the posterior fossa with which to deal. An abscess in this region of recent origin may present many of the same symptoms as when located in other regions of the brain.

Treatment. In searching for a collection of pus in the brain, irrespective of its location, a few points in the technique may be mentioned. It is well to bear in mind when we are searching the various regions of the brain for pus, that the skull should be entered at a point corresponding as nearly as possible to the floor of the lobe we are about to explore, in order that free drainage may be secured. There should be sufficient exposure of the dura to enable the operator to thoroughly explore the region in all directions, for many times the otologist is at fault here because he makes too small an opening in the skull, and produces more injury to the dura and cerebral substance by so doing than if the field of exposure were larger. When the dura has been explored, it is usually incised in its horizontal plane, care being taken to avoid severing any large blood vessels which supply it. After it has been incised, silk sutures should be passed through the flaps, as in this way they can act as

retractors drawing the edges apart, and do not injure the dura. Should the brain exploration prove negative, they can then be used to close the opening that has been made, before proceeding to expose other portions of the dura. There are several methods of exploring the brain, and all have their advocates. My own experience has led me to rely upon the use of a long narrow-bladed scalpel, and if pus be encountered, to withdraw the knife and introduce into the opening made by it, a pair of forceps with the blades closed, and then enlarge the opening already made by separating the handles. This will make an opening sufficiently large to admit of the drainage of any cavity that may be found. The use of the finger to enlarge the opening made by the knife in the cerebral tissue is, I believe, fraught with danger to the surrounding tissues on account of the pressure it exerts. The cavity may be cleaned by one of two methods, depending on whether we are dealing with a pus accumulation of a recent or remote origin. If of recent origin, and without the presence of organized tissue to wall it off, the least amount of manipulation is the better, it being cleansed by a very gentle mopping with narrow strips of sterile gauze, and drained by inserting a small wick of gauze down to the bottom of the cavity, allowing the brain substance to collapse around it, for it is a well demonstrated clinical fact that brain abscesses of the acute type discharge but little after evacuation, and consequently do not need to be packed. If, however, we are dealing with an abscess of long standing, there will be, aside from the pus, considerable broken down and disintegrated brain tissue which can best be removed by gentle irrigation with a warm saline solution, after which the cavity can be mopped out as above with sterile gauze, and drainage can be accomplished by passing a large wick down to the bottom of the cavity. This wick can be moistened and rolled in powder composed of equal parts of iodoform and boric acid, after the manner formerly advised by Macuen. But in addition to placing a wick in such an abscess cavity, the whole interior of it should be packed quite firmly with gauze to promote repair, for with its limiting membranous or connective tissue wall it does not collapse around the wick as does the acute type of abscess. A very serviceable drain in use is also that of a decalcified turkey bone.

Before draining the abscess cavities, the utmost diligence should be exercised in searching for multiple abscesses which occur frequently, and are many times overlooked and found only at subsequent operations or upon autopsy.

There are a few intra-cranial lesions of the pyaemic type, otitic in origin, that I have not mentioned, such as a thrombus of the cavernous sinus, etc., but I have omitted them purposely as they occur very infrequently.

In order that fewer of the pyogenic diseases that have been considered may occur in the future, it is our duty as otologists to impart to the undergraduate of medicine in our colleges, the gravity of a running ear, so that when they are later confronted with this condition, appropriate means for its relief can be at once instituted.

There is a subject of the utmost importance that deeply interests us as otologists to-day, and though it is one that by no means can properly be classified under the heading of this paper, yet it is of such vital importance to both the aurist and the patient, that I am going to crave your indulgence for a few moments longer to consider it. I refer to the indications for the performance of the so-called radical, or Stacke operation.

*During the past five years there have been so many radical or Stacke operations reported done for the cure of chronic otorrhea, that one is led to pause a moment and ask himself whether all were necessary, or if some of the many cases reported could not have been cured by other and simpler means. I would in no sense be understood as belittling this operation, for I know of no other that offers such safety to the patient as this does, when the indications are distinct for its performance. But from observations and reports, I am inclined to believe that it is frequently done when little or no necrosis exists, and before other means of a simpler and more conservative nature have been tried to cure the discharge.

What then, are the indications for doing this operation, First, the presence of dead bone in the tympanic cavity with or without the presence of cholesteatomatous masses. Second, a train of systems occurring as a result of this necrotic area, which are briefly, headache, localized or general on the affected side; vertigo of the intermittent type; nausea and vomiting at times, and intermittent pain, to be replaced by a dull throbbing pain when drainage is obstructed; unsteadiness of gait in advanced cases, and an intermittent or constant purulent discharge from the middle ear, the odor of which is foul and an indication of necrotic bone.

Combined with these, in a certain number of cases—particularly when the process is of long standing—is a train of mental symp-

*Abstract from a paper read before the American Otological Society, at its fortieth annual meeting at Washington, D. C., May 7th, 1907.

toms, which in many of the cases produce a mild form of melancholia, caused by the patient's dwelling continually upon the local process. Then again, in a number of cases, there is a persistent and most distressing tinnitus, and frequently this has so upset the patient's mental equilibrium that all other symptoms are of minor importance compared to this most distressing one.

When we have the history of a long-standing discharge from the middle ear, and upon examination we find dead bone present, with several of the above symptoms prominent, then I believe we have distinct and positive reasons for advising the performance of this operation. On the other hand there are many cases in which the patient is advised to have this operation done simply because for a few weeks or months there has been a discharge from the middle ear, scanty in character, where upon physical examination no dead bone can be demonstrated by the probe, or other means brought to aid the examiner. In some of these cases the probe does encounter exposed bone where the mucous membrane covering it has been destroyed in the suppurative process, but an area of exposed bone should not be mistaken for dead bone. Again, take a case giving the history of an intermittent discharge from the ear for several months, with occasional attacks of pain and the audition but slightly impaired. When upon examination we find a drum membrane markedly thickened and swollen, with a small perforation situated some distance higher than the level of the tympanic floor, and the canal containing more or less foul smelling secretion because it has been allowed to accumulate there and decompose, a diagnosis of intra-tympanic caries is immediately made, or jumped at, from the character of the discharge, and an operation advised as the only means of a cure.

In cases like this I believe it is extremely unwise to do a radical operation on the middle ear cavity until all persistent and conservative treatment has failed to bring about resolution in these structures. In many cases of a type similar to that described, cleansing and a free incision in the thickened and swollen drum membrane, so as to freely drain the cavity behind it—this followed by the simplest measures, that of keeping the canal sterile and stimulating the part as needed, will cure a large percentage of these cases, and at the same time preserve for the patient an audition that will be serviceable for the remainder of his life; and this, too, without inconvenience or loss of time. Whereas, if a Stacke operation

were done on such a case, the hearing for all practical purposes, namely conversation, would be a thing of the past—to say nothing of the inconvenience, suffering and loss of time to the patient.

Another class of cases frequently coming to the operating table for the Stacke operation is that of children giving the history of a discharge from the middle ear for several months, as a sequel of grippe, measles, scarlet fever and other inter-current diseases. In some of these cases persistent conservative treatment has failed to bring about a cure. The adenoids and enlarged tonsils have been removed, hoping thereby to lessen the mechanical irritation in the naso-pharynx so that resolution will be established, but without avail. If, instead of the Stacke operation being done on these children, the mastoid were opened and the middle ear drained posteriorly, and at the same time a free incision were made in the drum membrane, the suppurative process would speedily cease, and what is of the utmost importance for the future of these young patients, their hearing would be preserved—if not in its entirety, nearly so in the majority of cases. If the so-called radical operation had been performed on these patients, the hearing for all time would be very much diminished, if not entirely lost at the end of a year or two after such an operation.

During the last two years the writer has seen forty-four cases of the above-described type in children, operated upon by the posterior method, and all discharge cured except in two cases. The audition in thirty-eight of these cases was as perfect as the opposite side. Of the remaining six cases, the audition was improved in four, and two had to be operated upon again. the Stacke operation being done at the second sitting.

In a certain number of cases of the adult type, where the only prominent symptom is that of otorrhea, scanty or intermittent, the duration of which is a few months or a year, and a section of the drum membrane is found wanting, it would seem wiser to first perform ossiculectomy and curettage of the middle ear, hoping thereby to cure the condition by promoting drainage, rather than to at first do the radical operation, which however should be done later provided the simpler measures instituted be not successful. The question naturally arises here, "how long should one be content with conservative treatment of a running ear before abandoning it and advising the patient to submit to the radical operation?" I believe it is impossible to lay down hard and fast rules as to the

length of time an aural discharge may be allowed to continue without resort to surgical procedure, as many things have to be taken into consideration. The duration of the discharge, its character, the previous treatment the patient has been subjected to, and, above all, his general physical condition—for this may be so depleted and below par, that it is well nigh impossible for a local condition to resolve while the patient's general system is so far below the normal health standard. Generally speaking, however, if from two to four months' conservative treatment does not bring about a favorable result, then operative measures should be advised. This is, of course, if no evidence of a serious extension presents itself during this period. Should it do so, then a prompt operative interference is at once demanded.

When talking to patients about the advisability of having such an operation performed, the question arises as to how much or what should be said relative to audition, whether it will be as good or better than before operation, or if it should be diminished, to what extent. The writer has seen a number of cases in both hospital and private practice where after operation the patient had volunteered the statement, that had he known his hearing would be so poor as it was then he would never have had the operation done. Such a statement as this should have but little weight when we compare the diminished audition with the possibility or probability of an intra-cranial condition occurring in cases where advanced necrosis was present. It should, however, be judiciously weighed in cases where the discharge has been of short duration, as many times these patients are prevented from earning their living at what was their former vocation, after having submitted to the operation. I therefore believe it to be our duty not to omit telling these patients when they come to us for advice that their audition may be permanently impaired by the operation. That there are a number of cases of this type operated upon, where brilliant results are reported from the standpoint of improved hearing immediately following the operation, we all know. But how about the hearing one or two years later, after a substantial mass of scar tissue has formed in the tympanic cavity? It should not be so much the immediate as the future result that we should endeavor to obtain for these patients.

Another point that these patients who submit to a radical operation should be enlightened upon is the possibility of an injury to the facial nerve. While none of us who do this operation expect

such an accident to take place, still there is always a possibility of its occurring, no matter how skilful or experienced the operator. Should such an accident occur without our patient having previously been told of its possibility, it places the surgeon in a very unpleasant position, and for this reason, if for no other, it would seem wise to acquaint a patient who contemplates having this operation done of the possibility of such an accident occurring.

After the Stacke operation has been done, the question in the mind of the operator is what to do to bring about a speedy dermatization of the tympanic cavity, and it is the belief of the writer that the primary skin graft seldom if ever hastens the duration of this process. Used secondarily, or several days after the operation has been done, it is, I believe, a distinct aid in the hastening of the healing process in a few selected cases. In the majority of cases where it is used either primarily or secondarily, I believe it does but little good, as it sloughs from the surface on which it has been placed, or is torn away or displaced during the earlier dressings of the case.

This conclusion is based upon a faithful and conscientious trial of it, both as a primary and secondary graft. Without its use, I believe the majority of cases operated upon dermatize quite as rapidly, if not more so, than where it has been used. In the experience of the writer the best means of effecting a rapid cure of the condition operated upon is not the placing of a graft in the tympanic cavity and adjacent to it, but the complete removal of every vestige of the disease, and if this be done a cure will follow in nearly every case, independent of all other aid.

62 West Fifty-second Streett.

Injection of Solid Paraffine in Ozena. DR. RICARDO BOTEY. *Archiv. de rinol., laryngol., otol.*, May-June, 1906.

The author extols the superiority of solid paraffine over liquid paraffine in the treatment of ozena. He describes a syringe of his own design, by means of which injections of either solid or liquid paraffine may be made.

In 360 patients treated by this method, Botey draws the following conclusions: 10 per cent. of cases of ozena are incurable or but slightly benefited; 25 per cent. may be much improved; 45 per cent. are curable, but incompletely, and 20 per cent. of the cases may be entirely cured. SCHEPPEGRELL.

AN ORIGINAL METHOD OF OPENING THE ANTRUM OF HIGHMORE INTRA-NASALLY WITH EXHIBITION OF NEW INSTRUMENTS.

DERRICK T. VAIL, M. D., CINCINNATI, OHIO.

Having faithfully employed in many cases the various operations and therapeutical measures for the relief of chronic empyema of the maxillary antrum, the writer formed the following opinion nearly two years ago:

1st. That *chronic* antrum empyema is incurable by any and all medicinal agents employed locally in the nature of douches, either through the natural opening or through cannulae thrust through any of its walls.

2nd. That any attempt to cure by establishing drainage (?) through gold, rubber or silver tubes, whether inserted through the nasal wall, canine fossa or alveolus of a tooth, is unsurgical and only prolongs the trouble.

3rd. That the drainage and curettement of the cavity through the canine fossa with the establishment of a permanent fistula, in which a rubber plug is inserted for handy removal by the patient, who is taught to wash out his own antrum, only establishes a chronic stream of foul pus in the patient's oral cavity; is disgusting, disappointing and a failure as regards a cure.

4th. That the removal of a considerable part of the turbinal wall, whether done according to the Caldwell-Luc method or any other, provided the opening is large enough, is usually successful in bringing about a cure with little or no after treatment. But the usual method entails a preliminary operation (turbinectomy) and a period of wait, during which time the patient is tortured with fears of the heroic operation yet to come. This feature, together with the nipping, tearing, crushing, boring procedures which are necessary with Gruenwald's and other bone forceps, in order to effect a large enough opening in the antro-meatal wall, was father to the desire to devise a simpler plan which would bring about the desired end without these objectionable features.

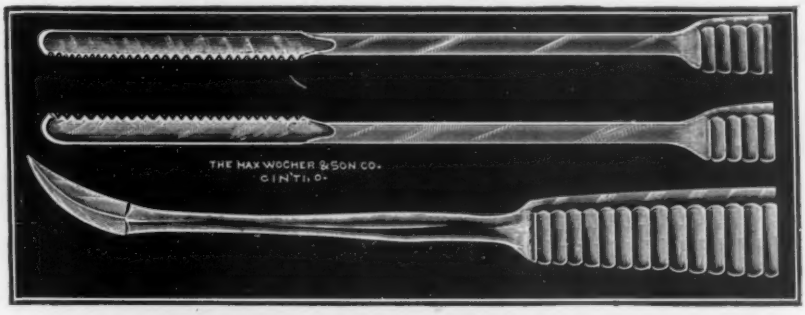
The grooved saw solved the problem for me. The first case had had the trocar of Krause thrust through the inferior meatus

* Read before the Twelfth Annual Meeting of the American Academy of Ophthalmology and Oto-Laryngology, Louisville, Ky., September 26, 27 and 28, 1907.

into the antrum cavity repeatedly and the cavity washed out, with no evidence that it would ever dry up. The end of the grooved saw was inserted through the opening made by the trocar and an oval window sawed out. After that there was, inside of a month, a cure which has remained permanent thus far (nearly two years).

I also learned to regard the heroic operation of Caldwell-Luc unnecessary in the cases I have managed by my method, although I do not wish to contend that the former is never indicated. The Caldwell-Luc operation has its place in surgery.

I have operated on seven successive cases of *chronic* maxillary empyema with the grooved saw with such satisfactory results that I would not subject a case to any more severe operation, at least until this method which I am about to describe had been used and proven inadequate.



(Fig. 1.)

The grooved saw, (Fig. 1) made for me by Max Wocher & Son, Cincinnati, can saw in only one direction, and that is circular or oval. The groove is carefully constructed of shallow depth, which will not permit a small opening to be made, for it is necessary to remove a large button of bone if the end of the operation is not to be frustrated.

The principles involved are the following: (*a*) free drainage of a foul cavity; (*b*) ready accessibility to a naturally inaccessible bone cavity; (*c*) establishing a permanent opening in a reservoir of pus to which there is but one natural opening, thereby making another large opening near the floor of the cavity, as it is well known that a reservoir or receptacle having only one opening cannot readily empty itself. This principle is easily proven by drawing off a fluid, say vinegar, from a barrel where there is always a

large opening, the faucet, for draining off the fluid, and a small opening, the spigot, for admitting the air; (*d*) establishing free ventilation to a foul chamber which normally contains but one natural window. This principle is employed in our sleeping and living rooms when we wish to ventilate. It is always necessary to have two openings, at least, if we want fresh air. (*e*) Establishing an opening in the pathway of a stream of antiseptic liquid ejected from an ordinary douche, thereby enabling the patient to wash out his own antrum by simply douching that side of his nose should it be required. (*f*) The establishment of an opening that will permit of inspection, packing and medication.

The Advantages of this Method Are: The painless operation under local anaesthesia; the lessening of personal risk to the patient; the speedy execution of the entire operation (in one case the operation was completed in three minutes, in another five minutes; ten minutes is the usual time); the operation completed without the necessity of a preliminary turbinectomy, and the cure resulting without the wearing of plugs and plumbing devices.

Fig. 2. This syringe can be boiled without damage to the packing. The needle shown is too short, it should 2 inches long.

Instruments Used: Kramer's speculum, angular packing forceps, flexible copper probe, Krause's probe, angular scissors that will cut well at the end, special hypodermic for the cocain and adrenalin mixture (Fig. 2) special perforating history (Vail's), (Fig. 1) special grooved antral saw (Vail's) (Fig. 1).

The Operation: Having sterilized the patient's nose, lip and nasal vestibule with soap and water bichloride, douched the nasal cavity in front and rear by post-nasal douche, the hairs of the nasal fossa are cut short and plegets of cotton soaked in 5% cocain are packed under, upon and above the inferior turbinated bone. A wait of seven minutes by the watch is allowed, during which time the operator can busy himself seeing that the special aseptic glass syringe is properly sterilized and loaded with equal parts of 2% cocaine and 1-2000 adnephrin. This will reduce the cocaine to 1% solution and the adnephrin to 1-4000. The cotton is withdrawn from the nose and the operative field brushed with 1-5000 adnephrin

solution, then the needle of the hypodermic is inserted under the mucous membrane of the turbinal in the site of the operation, which is, be it remembered, not the front end, but the middle third of the turbinate. The solution is driven under the mucous membrane on the lateral wall *beneath* the inferior turbinate, as well as on the convexity of it. In all about 20 drops are injected. As soon as the needle is withdrawn the actual operation begins—no

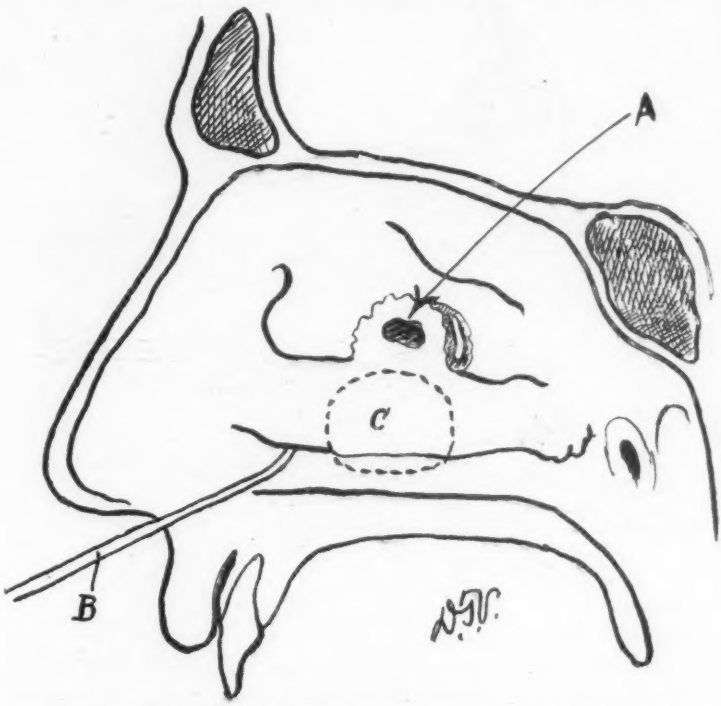


Fig. 3. Showing where the opening is proposed to be made at C. A represents the natural opening; B, a probe pointing to the outlet of the nasal duct.

need of waiting. The perforator is passed in the nose point downward toward the floor. When the middle of the inferior turbinal is reached, it is turned directly toward the antrum and thrust through the bony partition under the inferior turbinate by a positive pressure, at the same time forcing the handle of the instrument toward the septal side. When the antrum is entered, the

instrument is forced backward toward the pharynx and forward toward the nasal entrance to enlarge it in order to insure entrance for the saw, which is next used. The saw is inserted well through the slit with the teeth toward the antrum cavity. The tip of the nose is deflected toward the other side by the nasal speculum to permit inspection and a free sweep. The timid operator who lacks the surgical instinct will fail at this point, unless he makes

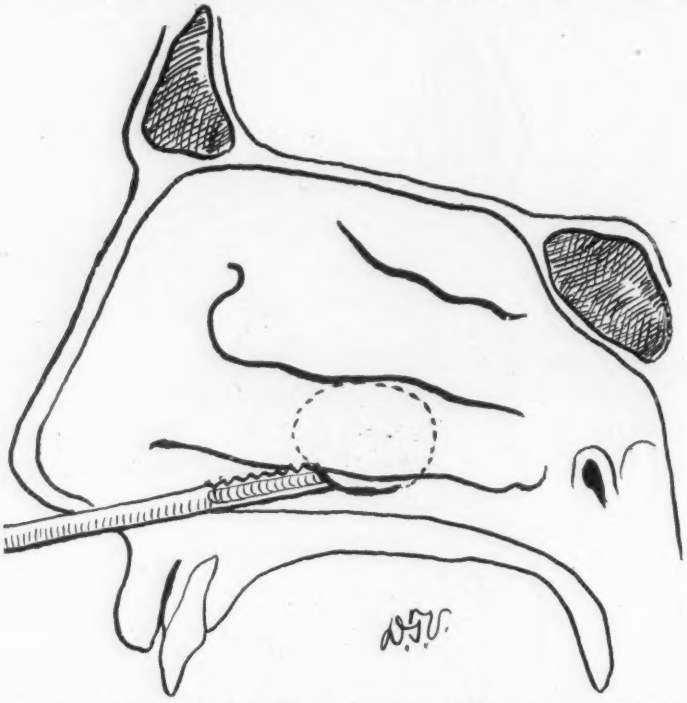


Fig. 4. The end of the grooved saw has been passed through an opening through the antro-meatal wall under the inferior turbinate. The dotted line shows the course it is proposed to take in sawing out the oval button of bone. The saw readily cuts through the turbinated body.

up his mind that there is nothing to fear. The saw is grasped firmly, the patient's head steadied by assistant, and a few bold strokes of the saw, keeping in mind the intent of making an oval opening and causing the saw blade to describe the oval in its course, which it naturally does, coming out where it first started, will render the maneuver successful, even in the cases of narrow nares.

There is usually an over-hanging apron of mucous membrane, which the saw, in its oblique course through the posterior half of the oval, has under cut. This is easily cut away by angular scissors or Gruenwald's forceps. The cavity is now open for exploration with the large probe of Krause. A little aristol powder insufflated will aid the vision in locating the opening. The cavity should be washed out with sterile salt solution and packed with a moist gauze strip, which is easy to do, and the operation is com-

Fig. 5. In sawing out the oval button of bone the mucous membrane of the inferior turbinate has been undercut, leaving an apron of soft tissue which should be cut away.

pleted. The patient is ordered to wear a cotton plug in the nostril for three or four days to guard against outside infection.

Should the cavity be filled with polypi and granulations, a condition I have not encountered among the seven cases cured by this method, it can be partly cleared out by means of curettes; but not entirely so, for the front half, at least, is out of the field of curettement. In that case I would not hesitate to inject the cocaine-adne-

phrin mixture under the mucous membrane of the canine fossa, expose the bone by an incision one inch long, peel back the periosteum, perforate the front wall of the antrum by means of a short, strong knife, and saw out a circular or oval button of bone with the same grooved saw that was used in the intra-nasal operation. This method would expose the antrum to thorough inspection and would, in fact, be a Caldwell-Luc operation with technic reversed.

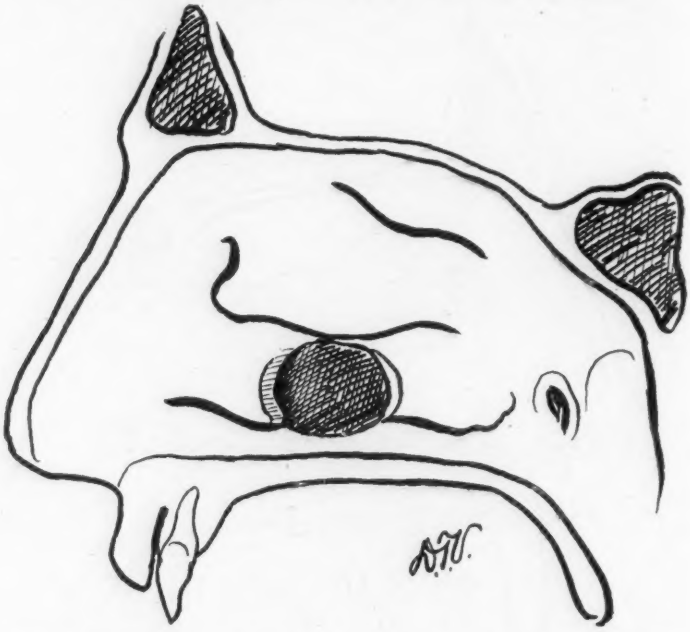


Fig. 6. Showing the relative size and location of the opening in the antrum at the completion of the operation.

I have done the Kuster operation through the canine fossa under local anaesthesia and it was painless.

Pynchon, of Chicago, has preceded me in the invention of a grooved saw. Pynchon calls his a curved saw, and it is of different shape and designed for low spurs. His saw, which is doubtless of great value for the purpose for which it was designed, would not do the work which my saw does in this operation.

The antral saw which I have devised for the operation has a rather wide blade and a shallow groove. The teeth are sharp and

should be kept so to work well. It will saw in a curved pathway and return to its starting point.

It will be observed that in this operation it is unnecessary to do a preliminary turbinectomy. The saw will leave the useful front end of the inferior turbinate and take only that part which is necessary to accomplish the success desired. In this way the valuable erectile tissue on the front end of the turbinate is conserved—a thing greatly to be desired, for, be it remembered, the physiological action of this tissue has the analogous action in controlling the entrance of air of varying humidity and barometric pressure in the nose that the iris has of controlling the amount of light intensities which enter the eye. Something has been said about the antrum opening which is made by the intra-nasal operation not being at the lowest point in the antrum cavity. It is true the antrum cavity dips considerably lower when the floor of the nose is horizontal, as in the upright position of the head, but it is such an easy thing to tilt the head to one side and make the nasal opening the lowest point, that I can see no force to that argument. During the sleeping hours, while the patient lies on the opposite side, the cavity would certainly drain out.

I have frequently demonstrated a point raised in the premise of this paper, namely, that the current of water from the douche will find free entrance to the antrum after the operation, for after such an anterior douching of the nose and the fluid has been blown out, the patient will empty a spoonful more by tilting his head, proving the point beyond question.

The sign of a cure is when there is no longer any catarrhal discharge and the nose is clear and free. The continuation of the douche after this point has been reached is to be deprecated, for there is nothing gained by douching a healthy cavity. Moreover, the patient will sooner or later infect his cavity with foul water through carelessness, not to speak of the other dangers of the douche habit. When the cavity is well the patient should be instructed to stop all treatment.

24 East Eighth Street.

RETRO-PHARYNGEAL ABSCESS. REPORT OF SOME UNUSUAL CASES.

BY M. A. GOLDSTEIN, M. D., ST. LOUIS.

The recognition of retro-pharyngeal abscess or lymph-adenitis retro-pharyngealis suppurativa, as it has been proposed to classify it, is by no means of recent origin in medical literature. As early a writer as Galen apparently refers to this affection as of common occurrence in his experience. Morell Mackenzie (Manual of Diseases of the Throat and Nose, vol. II, page 57), refers to the history of the subject as follows:

"The first notice of abscess in the pharyngo-esophageal region dates as far back as the second century of the Christian era, when Galen related a case which had occurred in his own experience and which terminated in spontaneous rupture. From his manner of alluding to the case, it would seem that he had seen several examples of the same kind, most of which had ended fatally. No mention of the complaint was made by any other writer, so far as I am aware, until the middle of the 18th century."

From this period until the early '70s of the 19th century retro-pharyngeal abscess is rarely mentioned. The most classic monograph on this subject was published by Bokai (sr. and jr.), who in an extensive experience at the Children's Hospital of Budapest collected over 500 cases of lymph-adenitis retro-pharyngealis.

It is evident, therefore, that these cases are by no means rare in recent literature, but it is a notable fact that with all of the subject matter at our command, many of the important data have been but imperfectly developed. Neither in the monographs nor in our numerous text books on pharyngology has the question of the etiology of this subject been definitely established. It is especially to be remarked that there is a great scarcity of case reports in American literature, and even in the more extensive monographs, as those of Bokai, Baginski, Henoch, Koplik and others, it is quite evident that most observations in this field have been made by pediatrists and not by laryngologists. The scarcity of these reports in laryngological literature, the obscurity of etiology, the limited subject matter in the text books prompt me to present a report of three unusual cases of retro-pharyngeal abscess with such comments as have been suggested in the observation and care of these cases.

Case I. Baby S., male, aged 20 months, was brought to me two weeks after the onset of an acute streptococcic bi-lateral tonsillitis. The condition had been diagnosed as "quinsy sore throat." The patient was treated by the family doctor who, according to the statement of the parents, did not deem it necessary to confer with a laryngologist. During the course of the treatment the doctor had made two incisions on the right side and one on the left side, and I am constrained to add, several directly into the tissue of the tonsil, to liberate pus from what he thought to be one of the natural sequelae of quinsy, namely peritonsillar abscess.

There is nothing especially worthy of mention to add to this case. I found the pharynx wall markedly bulging. The duration and bulging extended laterally to the tonsils, and these, also, were much enlarged. Externally, the neck appeared quite swollen, and a number of lymphatics could be distinctly outlined. Perhaps there may have been some difficulty in a differential diagnosis between peritonsillar abscess on the one hand and retro-pharyngeal abscess on the other in the early stages of development of this case.

I made a deep incision into the pharynx wall, and liberated a large quantity of pus. The child made an uneventful recovery.

Case II. Baby W., male, age 6 months, was referred to me by Dr. Zahorski and admitted to my hospital January 9th, 1907. Examination developed the following data: Temp. 99.4, pulse 140, resp. 38. Patient breathing heavily, extreme pallor with evidence of beginning cyanosis. The head was bent backward, the child seemingly breathing better in that position. The superficial and deeper lymphatic glands of the neck, the post-auricular and sterno-cleido-mastoid area on both sides were greatly enlarged, the tongue swollen, and the posterior wall of the pharynx showing distinct bulging, infiltration and oedema. The child gave forth incessantly short, hoarse, weak cries, and attempted to maintain the position with the head thrown far back. It had been unable to nurse at the breast for over 24 hours. The patient had been seen by a laryngologist 48 hours previously in consultation with general practitioners. An attempt at an examination of the pharynx had been made, and a portion of the posterior pharynx wall about one-half inch to the left of the median line and above the free margin of the soft palate had been excised with a narrow cutting or punch forceps and submitted for microscopic examination.

The report of the pathologist who examined this specimen within a few hours after its removel was embodied in a brief note to the attending physicians, the substance of which was as follows:

"My dear Doctor: The examination of tissue from the pharynx section referred to me today reveals distinct evidence of lymphosarcoma, and I am very sorry for the little patient."

On the strength of this microscopic diagnosis together with the other clinical evidence determined on examination the physicians in the case made a fatal prognosis, and told the parents that nothing further could be done in the matter. It was at this stage of affairs that the patient was brought to my hospital.

Fifteen minutes after arrival the little patient was placed in a recumbent position on the operating table with the head overhanging the table, and an aspirating trocar plunged into the pharynx through the wound made by the excised section of the pharynx tissue, the trocar being carried well down until the surface of the vertebra could be felt. On withdrawal of the trocar, a single drop of pus was seen about the tip of the canula. I originally selected this site for penetrating the pharynx with the trocar, because of the wound previously made in examination of the pharynx. On noting the presence of even a small drop of pus about the tip of the trocar, I felt positive that more pus would be found. Both on digital examination and on inspection with reflected light there seemed perceptibly more bulging of the pharynx well forward on the right side than on the left, where thus far all examination measures had been carried on.

With a long, slender bistoury, held with its flat surface against the palmar surface of the index finger, and projecting about three-fourths of an inch beyond the tip of my finger, I penetrated the right pharynx wall, cutting from below upwards and making an incision of about one inch in length. This was followed by a gush of pus, and two ounces of thick, greenish-yellow pus were liberated. To insure free drainage, I opened a pair of dressing forceps in this incision, spreading the tissue in all directions, also making firm pressure on the neck on either side.

Several unsuccessful attempts at nursing were made. Four hours after leaving the operating room, the patient took about three drams of mother's milk from a spoon. The throat was swabbed every hour with an antiseptic alkaline solution.

Within 24 hours the temperature dropped to normal, the pulse to 120, and the baby took the breast and nursed with ease. The patient was discharged on the tenth day. The infiltration of the lymphatic glands had all disappeared, and the wound entirely healed.

Case III. Baby R., male, age 9 months, referred to me by Dr. Friedman, and admitted to my hospital December 27th, 1906. Temp. 100.6, pulse 138, resp. 32. The history of the patient's present illness was somewhat indefinite in detail, and extended over a period of some two or three weeks. Treatment had been undertaken by various physicians for bronchitis, grippe, tuberculosis of the neck, syphilis, etc.

The first unusual feature presented in this case was the difficulty of examination. I was unable to make a direct inspection of the pharynx, for every time an attempt was made to depress or draw out the tongue, or, in fact, every time the mouth was forced open, the child began to choke. The neck on the left side was swollen, a number of lymphatic glands could be distinctly outlined and were intensely indurated; an occasional glimpse of the interior of the pharynx presented a swollen condition of the posterior and lateral walls together with that of the left tonsil. Dr. H. W. Loeb saw the case in consultation with me the following day, but no more definite data could be obtained, even after digital examination of the pharynx, because of the patient's tendency to choke. It was decided to postpone further examination until the next day. The throat was swabbed with Adrenalin solution, and Ichthyol applied to the side of the neck. The baby was beginning to nurse with some difficulty.

At 11:30 the night of December 29th, I was called hastily to the hospital, as the child developed rapidly increasing cyanosis. An immediate tracheotomy was decided upon. I performed this operation under Schleich's anesthesia, and it may be of practical value to describe some of the complications that presented themselves during this operation.

I used the Schleich's anesthesia because of the rapidly developing precarious conditions of respiration and circulation. The difàculty and rapidity of respiration, the rapid, thready pulse and clammy skin were all contra-indications to the use of general anesthesia. In fact, the tracheotomy might have been undertaken without any form of anesthesia either general or local, because of the condition of extreme collapse of the patient.

I was prepared to find a small trachea in an infant of nine months, but the unusually small caliber of the trachea in this child, an infant physically well-developed in every other respect, took me by surprise. I had neither tube nor canula small enough to introduce into this infantile trachea, and my assistants patiently held open the edge

of the tracheal wound with hooks and bent hairpins while I racked my brains for a solution of the problem. During my visit abroad, last season, it was my privilege to see much of the splendid neck surgery of Mr. Henry I. Butlin of London. Among the practical devices which I saw used by this resourceful surgeon was an adjustable metal flange, intended especially for use in combination with soft rubber tubing in similar emergencies. I cut a piece of No. 10 velvet rubber catheter 1½ inches in length, adjusted this to the flange and placed it in position in the trachea. After several coughing paroxysms the patient began breathing through this improvised tracheal canula, and it was maintained in position for 48 hours. On several occasions the tube was dislodged suddenly by paroxysms of coughing, but was immediately replaced.

An unusually excessive secretion of mucus about the tracheal wound and in the tube was noticed, due either to the presence and irritation of the rubber tubing in the trachea or to active inflammatory changes in the pharynx. We experienced much difficulty in keeping the tube free of mucus. At first we resorted to sterilized feathers which were introduced into the tube; but the coughing paroxysms which followed were so severe that the tube was dislodged at almost every such attempt. The caliber of the rubber tubing was so small that but little inspired air could be exhaled by the patient unless the tube were kept constantly clean. I had never been partial to the use of feathers as a means of cleansing the tracheal canula, and I was indebted to an ingenious suggestion of my assistant, Dr. W. M. C. Bryan, by means of which we succeeded in keeping the tube clean and pervious in a more aseptic manner. A piece of medium-sized tempered wire about six inches in length was brought into service as an applicator, looped at one end for a handle and provided at the distal end with a long, narrow loop and a tiny hook, about which absorbent cotton was tightly twisted. The purpose of the hook at the end of the applicator was to prevent the cotso penetrating that for several months after the patient had been ton from slipping off while in use. Several dozen of these applicators were prepared aseptically, and proved a valuable and sufficient substitute for the time-honored feather. When they were once used, they were laid aside, the cotton burned off, and the wires again wrapped with cotton were ready for use.

Immediately following the tracheotomy and the insertion of the tube, the cyanotic symptoms disappeared. The temperature still fluctuated between 103 and 105 with the usual septic curve. The

pulse varied from 170, twelve hours after the tracheotomy, to 140, one hour before the retro-pharyngeal operation three days later. Respiration from 32 to 50. At 10 A. M. on the day of the tracheotomy the baby took the breast without much difficulty, and continued to nurse at intervals of three or four hours until shortly before the time of opening the retro-pharyngeal abscess, when it refused to nurse.

The patient was watched constantly, day and night, and especial stress was laid on maintaining the tube in position, as with every spell of coughing the soft rubber tube was in danger of being kinked and forced out of the tracheal wound. On the second day following the tracheotomy, an aluminum canula was in readiness and was substituted for the rubber tube. The patient began at once to breathe more freely, the secretion of mucus was lessened in quantity, the tube was more readily cleansed and more easily maintained in place. The child's physical condition was now sufficiently improved to warrant a more exhaustive examination of the pharynx, and while no distinct fluctuation in the pharynx wall could be obtained, the bulging, temperature, and other clinical data all warranted the diagnosis of retro-pharyngeal abscess.

At noon on December 31st, three and one-half days after the tracheotomy had been performed, I made a deep incision with a bistoury, guided by my finger into the left posterior pharynx wall, and liberated about two ounces of pus, burrowed deeply under the pharynx muscles. I dilated the wound with my finger, and an assistant made firm pressure on the neck inwards and under the ramus of the jaw. The head of the patient was held downwards and backwards to avoid the possibility of pus finding its way either into the trachea or the esophagus. The draining of the pus immediately relieved all tension and swelling in the neck and glands.

At 6 P. M. I made a similar incision of the pharynx wall to the right of the median line, again evacuting about two ounces of pus mixed with blood. At midnight the temperature had dropped to 99.8, pulse 140, resp. 36. The patient slept well nearly all night, waking at intervals of two hours, at which time the tube was cleansed, and the baby nursed. The aluminum canula was maintained in position until January 20th, a period somewhat over three weeks.

In so young an infant, where the respiratory tract is of necessity unusually delicate, and where even slight irritations are very likely to produce unfavorable complications, I wish to emphasize the importance of a therapeutic measure, the value of which I was well

able to observe, especially in this case. In many clinical reports of children under one year of age, where a tracheal tube has been maintained for a protracted period, fatal results have ensued of septic bronchitis or pneumonia. In the compound tincture of benzoin we have a valuable agent to prevent sepsis in the lower breathing tract and to soothe the irritated and inflamed mucous membranes in the post-operative treatment of this class of cases.

In this particular case, compound tincture of benzoin was vaporized freely and constantly in the bedroom. I used vaporizing apparatus with a conical tip, and every few hours had the vaporizer brought to within two feet of the patient's throat and the vapor directed specially to the tracheal tube for ten or fifteen minutes at a time. Nor was this precaution of benzoin vaporization relinquished at any time during the conduct of the case. I insisted on the room being constantly saturated with this medication. This vapor was discharged from the private room of the hospital, the smell of benzion was very apparent, though the room had been daily ventilated.

Tracheotomy has become so common a surgical procedure that its technique and the simple conduct of the operation require but little comment. It is the after-treatment of these cases which frequently taxes the resourcefulness and ingenuity of the surgeon to his full limitations.

There was another condition associated with this case that may be worthy of comment. When the retro-pharyngeal wound had healed, and all swelling and oedema about the larynx had disappeared, there was no further cause for maintaining the tracheal canula in position. On withdrawal of the tube we found that another change had taken place. The child was unable to use its voice. When the tracheal opening was plugged up and the child made an effort to cry, there was a peculiar, hoarse, whistling sound as of air passing through a tube of narrow lumen, the upper part of which was rigid. I advanced the opinion, concurred in by my colleagues in the case, that this loss of voice was due to a deflection of the natural axis of the trachea and larynx. The intense infiltration of the tissues of the pharynx, the marked bulging of the musculature of the pharynx walls, the maintenance of the tracheal canula in a rigid position in an infantile trachea for a period of over three weeks, all contributed their share to throw the larynx or the chink of the glottis out of position in their relation to the axis of the trachea. The column of air in the trachea did not strike the vocal cords direct, but was impinged and deflected from the unnaturally curved walls of the trachea. I was making every preparation, on the sec-

ond day following the withdrawal of the tube, to insert an intubation tube into the larynx, with the hope of gently forcing the trachea and larynx toward their normal axis, when slight vocal sounds were noticeable in the child's efforts at crying. These greatly improved, and by the time the tracheal wound had healed, a perfectly normal vocal function was re-established.

I have selected the above three cases because they offer in their diagnosis, variations, clinical data, technique, and post-operative treatment and sequelae many valuable object-lessons which are but seldom and but briefly described in the literature of this field.

In Case I, we meet with a condition that is more frequent than a cusory glance into this brief report might indicate. It is very likely that many cases diagnosed off-hand as quinsy, frequently followed by peritonsillar abscess, have in reality proven to be cases of retro-pharyngeal abscess. Perhaps it is difficult, in the early stages of infiltration about the fauces and the rapid induration about the soft palate, which is the typical picture in peritonsillar abscess, to sharply differentiate this condition from pus-formation posterior to the pharynx muscle. At times the pus focus is so deeply buried behind the muscles of the pharynx wall that it is practically impossible, even in the later stage of retro-pharyngeal abscess, to detect the presence of pus by palpation, for the pharynx muscle is so thick and so indurated that no fluctuation is perceptible. This was apparent in each of the three cases above cited.

From the literature of retro-pharyngeal abscess at our command, it is a noteworthy fact that nearly all cases which have been reported have been in children under five years of age. It occurs somewhat infrequently in older children, and with extreme rarity in adults. If we exclude from our etiological consideration the small proportion of tubercular and syphilitic caries of the vertebrae, we must still account for the causative factor in the great majority of these cases. Why should retro-pharyngeal abscess occur so frequently, in the opinion of nearly all observers, in very young children, and why should this affection occur with increasing rarity, the older the patient? We know that in early childhood there is an unusual activity of the lymphatic ring and of the lymphoid tissue in the pharynx, and that there are several small, deeply located lymphatic glands imbedded in the connective tissue of the posterior pharynx. It would be logical to assume, therefore, that whenever an acute infectious process takes place in the nose, nasopharynx, accessory sinuses, ear, tongue or larynx, a continuity of lymphoid tissue

may readily carry such an infection into the depths of the pharynx walls. If the presence of this lymphoid tract in the pharynx areas is accountable for the frequency with which retro-pharyngeal abscess occurs in very young children, than the scarcity of its occurrence as the age of the subject advances may also be conversely proven, for, with adolescence and maturity, the lymphoid tissue which is so great a productive agency of hypertrophy or disease of any part of Waldeyer's ring greatly atrophies, and the pathology depending on this tissue is of necessity lessened.

Lymph-adenitis retro-pharyngealis *without* pus-formation is of rather frequent occurrence. The active stimulation of the lymphatics, the liberal distribution and wide radiation of the lymphatic glands in the pharynx itself and the susceptibility of young children to catarrhal inflammation of the mucosa of the upper respiratory tract substantiate the conclusions of such observers as Bokai, Baginski and Kormann, that in a large preponderance of patients so affected an enlargement of the post-pharyngeal lymphatic glands could be determined. In the early nomenclature of this affection retro-pharyngeal lymph-adenitis was classified either as idiopathic or as symptomatic. With the development of a clearer understanding and appreciation of the physiological and pathological importance of the lymphatic ring in its relation to affections of the pharynx, it is evident that a revision of this nomenclature could be made. While it may not be possible in each and every instance to definitely ascertain the first focus of infection, the culminating point of this affection may always be traced to an inflammatory or septic condition of the retro-pharyngeal lymph nodules. In a sub-classification, therefore, of this field, instead of referring to an idiopathic or symptomatic form, it may be more logical to consider retro-pharyngeal lymph-adenitis either as inflammatory or suppurative.

Case 2 presents another valuable object lesson. The clinical picture of this pharynx must have been very misleading, for it prompted the consultant in the case to consider the possibility of a malignant neoplasm and to remove a section of tissue from the bulging, indurated pharynx wall and submit it for microscopic examination. I can appreciate the hesitation of this laryngologist to offer a definite diagnosis without microscopic verification, for the tissue was dense, the swelling fairly circumscribed, and no other clinical data were apparent. The pathologist is the one who, in this case, might be open to criticism, not so much because of his error in the diagnosis of the microscopic section, but because of his positiveness in maintaining the diagnosis irrespective of any other data, and thereby

misleading the clinicians engaged in the case. It is not difficult to understand how a diagnosis of lympho-sarcoma could be made in the case under consideration. The induration and swelling of the pharynx muscle and the natural distension of the fibres of this tissue, together with the infiltration of lymph cells in the course of such an active inflammatory process, in a section taken parallel to the muscle fibre of the pharynx, might readily present a picture under the microscope similar to that of lympho-sarcoma.

If the pathologist, however, were in closer touch with the clinician,, and were informed of the clinical aspects of the case, of the induration and swelling that had taken place in the tissues, and the location and direction of the section which had been removed for microscopic examination, it is possible that such error might have been avoided. This experience simply emphasizes our position that, where a microscopic examination is called into question, it is a dangerous policy to offer a diagnosis based exclusively on such microscopic findings. The value of the microscope and of our pathological information can only be best developed when applied in conjunction with an intelligent understanding of the clinical data furnished in a given case.

The technical difficulties developed in the few cases which I have presented only serve to illustrate to what extent the ingenuity and mechanical skill of the operator may be taxed. The instrument catalogues present various forms of a combination bistoury and forceps for incising and draining retro-pharyngeal abscess, and yet there is nothing more serviceable than a slender, sharp, pointed bistoury, guarded and guided by the index finger of the operator.

A recent writer advocates that the patient, during operation for retro-pharyngeal abscess, be held in an upright position in the arms of an assistant, and the head well thrown back—a position similar to that frequently preferred for adenoid operation. This position of the patient seems illogical to me, especially where a large quantity of pus is likely to be liberated, for as a large proportion of these cases consists of young children who are unable to assist in expectoration or to co-operate with the surgeon by following his directions, it is possible that some of the pus might find its way into the trachea, causing septic inflammation of the bronchi or lungs. To obviate this, I direct the assistant to hold the patient flat on the back with the head overhanging, so that the outflow of liberated pus may be easily controlled.

The tracheotomy undertaken as an emergency in Case 3 is a step which, fortunately, is not often necessary in this class of cases, for

even under most favorable circumstances tracheotomy in such a young subject is a delicate and difficult technique, and the prognosis usually bad.

The incision of the pharynx wall should be free, deep and long, and the operator should observe the precaution to remain near the median line with the bistoury, so as to avoid wounding the internal carotid artery. Both in retro-pharyngeal and in peritonsillar abscess I make it a rule to introduce a pair of slender uterine dressing forceps into the incision and to spread the blades as wide as possible to break up any septa containing pus sacs and to enlarge the drainage areas. In one of my cases a second incision was necessary in the opposite wall of the pharynx, and I attribute this to the fact that the drainage following the first incision was imperfect.

I have used the data of these recent cases to bring out some of the features of retro-pharyngeal abscess that have either not been mentioned or have been but briefly touched upon in the literature of the subject. With our increasing knowledge concerning the physiological and pathological importance of the lymphatic system and its relation to many of the diseased processes which we encounter as laryngologists, the subject of retro-pharyngeal abscess will, no doubt, be more prominently considered.

3858 Westminster Place.

The Reduction of the Tip Tilted Nose. C. C. MILLER, (Chicago.) *Med. Fortnightly*. July 10, 1907.

The author begins by stating that the public is deeply interested in the methods to improve the appearance of the face, as shown by the conspicuousness of the "beauty columns" of the newspapers. He aims to interest conscientious, ethical physicians and surgeons in cosmetic work, so that it may be taken from the charlatans who control it today. This is largely due to physicians ridiculing any suggestion of an operation for improving the appearance, and after a time the sufferer quietly consults the advertiser.

The operation for tip-tilted nose, the author states, is performed without difficulty after the parts have been infiltrated systematically so that none incised are uninfiltrated. The solution used is not of material importance; it should contain a trace of cocain or similar agent. He gives a simple, clear drawing to illustrate his operation, and to it and the short description the reviewer must refer the reader.

EATON.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

Regular Meeting, November 27, 1907.

THOMAS J. HARRIS, M.D., Chairman.

PRESENTATION OF CASES.

A Case of Post Operative Cleft Palate. By W. W. CARTER, M. D.

To be published in full in a subsequent issue of THE LARYNGOSCOPE.

A Case of Congenital Palate Recently Operated Upon. By JOHN LESHURE, M. D.

This boy, about 7 years old, was operated upon about two months ago, and the case is presented to demonstrate some points in the operative technique, as well as features of the after education of these defectives to be mentioned later by Dr. Scripture. His personal and family history are devoid of interest. The cleft palate was a rather wide one, beginning about half an inch behind the incisor teeth and extending symmetrically back through the uvula. Posteriorly it measured about three-quarters of an inch in width, narrowing somewhat toward the front. The child was not a mouth-breather, although a considerable amount of adenoid tissue occupied the naso-pharynx, and he had the usual defects of speech. The adenoid tissue was not removed, for reasons to be mentioned later.

The operation was done under chloroform anaesthesia, induced by means of this apparatus (demonstration) familiar to us all. Its use saves a great deal of time, allowing as it does, the continuous administration of the anaesthetic. I have here a reprint of an article by Dr. Charles H. Peck, of this city, published in the Annals of Surgery, January, 1906, which admirably illustrates the steps of the operation, and I will not take up your time in going over them, further than to speak of one point which seems to me to be the critical point of the operation. After the flaps have been elevated and the palatal muco-periosteum has beeen divided so as to separate it from the nasal mucous membrane, the soft palate falls away somewhat from the nasal floor. The freshened edges are still held apart by the levator and tensor palati muscles, as well as the palate-glossus and palato-pharyngeus. By placing the tips of the fingers in the

posterior portion of the lateral incisions a sort of dry dissection and stretching of the muscles can be carried out, which usually relieved tension sufficiently to allow of satisfactory coaptation of the parts. Complete division of these muscles is thus rendered unnecessary. These palates are often quite inflexible and do not completely shut off the naso-pharynx from the pharynx. It is for this reason that I believe the adenoid tissue should be left in situ unless greatly hypertrophied, as it forms a sort of shelf, meeting halfway, so to speak, the velum, and rendering possible better pronunciation of the palatal consonants.

The sutures and final packing were removed on the tenth day, and that practically ended the treatment.

Case of Carcinoma Developing from a Chronic Leukoplakia Buccalis. By JOSEPH H. ABRAHAM, M. D.

A Case of Epithelioma of the Larynx, After Being Well for Six Years, Has a Growth of Doubtful Pathology on the Opposite Cord. By R. C. MILES, M. D.

Dr. Myles said that he had already reported this interesting case before the American Laryngological Association and the Tri-Ological Society. In 1901, this patient had applied to him for treatment for a rather extensive growth on the left vocal cord, near the processus vocalis. This was removed in one sitting. The growth was hard, and, his brother being a physician, Dr. Myles gave him the specimen which was submitted to a distinguished pathologist for examination, who reported that it was an epithelioma. Dr. Myles then proposed a plan of thyrotomy, but the patient declined operation for reasons of his own; and instead of developing further, the growth disappeared and did not recur. He was examined last year and there was no appearance of any lesion. The present lesion is on the right cord, the other was on the left. The present growth is soft and has a whitish appearance. The sputum has been examined for bacilli, with negative results. Iodide of potassium has been tried, but has had no definite effect. Dr. Myles said that he would remove a piece from the larynx and report the result later.

The case was most interesting from a pathological standpoint, and in regard to the question of the curability of cancer. If he had cancer before, it has been well for six years. The present growth does not seem to have any relation to the former one.

Microscopic Findings on Two Laryngeal Cases. By T. J. HARRIS, M. D.

Dr. Harris reported the microscopic findings on the two laryngeal cases presented by him at the last meeting,—one a women with a chronic papilloma of the anterior commissure. The growth was removed and was reported by Dr. Wright to be a hard variety of papilloma. The second case was a patient with a growth on the right cord. The report in this instance showed an area of edematous connective tissue covered with squamous epithelioma, the site of an acute inflammatory process.

Dr. Harris said that it was hoped that this plan of making complete and late reports of the cases presented could be carried out, so that the section would have full information concerning them.

Researches on the Voice with Demonstrations of the Methods of Recording and Analyzing by the Phonograph, Gramaphone and Graphic Apparatus. By Prof. E. W. SCRIPTURE, M. D.

To be published in full in a subsequent issue of THE LARYNGOSCOPE.

DISCUSSION.

PROFESSOR HALLOCK said that he felt something like the man who was walking down 23rd Street looking up at the Flat Iron Building when an automobile ran over him. He was not entirely killed, and got up and was pulling himself together when the chauffeur said to him: "You ought to look out." "Gee!" replied the man, "you are not coming back, are you?" He only hoped that Prof. Scripture would not come back over him, or he might be finished on the return trip. Of course, as a physicist, he represented the Helmholtz side of the question rather than the later one. He expressed his unqualified admiration for the quality and quantity of the work done by Prof. Scripture on this subject. The larger part of the work is work which is very little affected by any theoretical interpretation put upon it. It is work of fundamental importance. The main thing here is that we know certain things about the records of the voice; and with the great majority of the work he had no difference of opinion with Prof. Scripture. He does not, however, agree with him on the question of the tone quality of the voice and its origin. With reference to the *variety* of the vowel sounds in the human voice he is perfectly ready to substantiate anything Prof. Scripture has to say.

A number of years ago he himself had tried a comparatively simple problem of analysis of the vowel sound produced on a uniform

pitch, having no facilities for studying the methods of attack or finish of the vowel, but simply the middle part sung by a professional singer whose business it was to keep on a pitch. He had tried to analyze these sounds, and tried to get out of the records which were made, some clue as to what is the proper vowel sound that Prof. Scripture referred to. He could make records of the same individual, and the same vowel as sung by the same individual any number of times, and obtained practically uniform analyses. The individual would sing *a, e, o,* for instance, and these sounds were analyzed with a considerable degree of accuracy. The vowel *ah* for instance, differs as much from the same sound in another voice as *ah* and *oh* in the same voice.

One very important point on which he does not agree with Prof. Scripture is that the soft palate should close off the nasal cavity. When speaking of normal vowels, Prof. Hallock's idea is that in general the soft palate should be completely free and down. The difference is marked, and can be emphasized very easily. If you give the vowel the least nasal twang, you are bound to have the soft palate down. Have a hard vowel and the palate is against the roof of the pharynx.

Again the question is as to what is the correct vowel? Prof. Scripture has apparently taken the scientific way to get at it, and as far as that is concerned he is better able to judge than I for he has analyzed many vowel sounds and has reached certain conclusions.

With regard to the origin of the tone quality: We get a certain quality which, as Prof. Scripture has said, is resolvable. Any voice curve that you may conceive of is resolvable into a series of so-called simple curves. That is true. The light of the sun is resolvable into the spectrum, which we recognize now is a practically indefinite number of different rates of vibration—colors, as we call them. The present idea is well represented in the theory of light, which is that what we call white light, what comes from the sun, did not originate in the sun, as a collection of an infinite number of light "tuning forks," so to speak; that there was nothing there that had vibrated with that complex rate, and that they all came to us in their particular way.

If you take the case of the reed pipe, the striking reed comes down and shuts up the cavity completely every time it lets through a puff of air. The vocal cords close similarly. The "free reed" does not strike the sides as it cuts off the puff each time. The two forms of reeds are made to allow puffs of air to come through. It is the

quality of these puffs of air which differs very considerably, and the thing to consider is the possibility of resolving the puff of air into its various components.

Prof. Scripture does not approve of the analysis into the 1, 2, 3, 4, series. He says "Why should there not be in-harmonic tones in the voice?" and proceeds to conclude that there are. Professor Hallock said that he did not know exactly why, and was not sufficiently familiar with that new theory to say why they should come in a 2, 6, or a 3, 9. If one is going to put them in arbitrarily, there is no reason for stopping. You can say 2, 5; 7, 6; 9, 3; etc.—so that as far as that is concerned you can get out of a given curve almost any series of components. In his own analysis, he did not find one of these intermediate inharmonic tones, although they hunted for them. There were no other tones than the 1, 2, 3, 4 tones, and none other were found. There was no trouble with the vowel *ah*, particularly if it had a nasal twang. There was no trouble in finding the regular series of 1, 2, 3, 4, over-tones. The resonators were tuned all through these spaces and nothing was found between, so far as the question of resonance was concerned.

The behavior of the resonance cavities is an old subject concerning which music teachers and voice authorities have argued for many years. It is not fair to compare the action of the lining of the mouth and nose cavities with a lining of wet cotton. That is very different from the lining of the mouth, even the cheeks and the surface of the tongue. You are all familiar with the surface of water itself. If you apply force, gently it will yield readily. On the other hand, it will reflect sound very readily, as well as a solid surface.

Prof. Hallock said that as a person who has had some of the laws of mechanics hammered into him for many years, he could not bring himself to understand how a series of unrelated puffs can continue a vibration in a resonator, the resonator having no relation in its pitch to the puff. He was familiar with the examples given this evening, but when you strike the cheek with the hand that is a complex puff. One of the fundamental theories of vibration is that in order to have one vibrating system set another in motion, either system No. 1 and system No. 2 must be in perfect resonance or they must be attached together, and system No. 1 must be so powerful as to overpower the natural vibration of the other. Having this in mind, he cannot understand how puffs of air coming through the larynx are going to set the air in the resonance

cavities into vibration at an arbitrary unrelated pitch.

With reference to the control factors in the larynx, the pitch—the reply of the other side is that the same thing, the control of pitch, of the string, will be the thing that controls the rate of vibration of the vocal cords, or whatever you call them. Of course you have in the larynx the means of control through the tension by the cricoid cartilage and the shortening of the vocal cords, by the rotation of, the arytenoid cartilages, and finally the contraction of that vocal muscle running along the back of the vocal cord or pad. The muscle ends further toward the edge, and the more tensely that is contracted the less of the cord is free to move.

Of course all these factors may be said to affect the pad, the same as the cord. We have fortunately a number of cases that enable us to separate the two things rather distinctly. The original source is in the larynx necessarily. There is little doubt of that, and it would be pretty surely evidenced by the case of the man who very conveniently cut his throat over the top of his larynx, and the operating surgeon seeing that he was in no danger, amused himself by putting a piece of pasteboard in the cut and talked to him, and he produced sounds underneath. We had a case in Wurzburg of a man whose larynx was removed and who talked with a little reed, though he had no control over the pitch. So we have no quarrel on the point that the disturbance originates in the larynx and the articulation modification is in the mouth and cavities.

Prof. Hallock said that he felt guilty in contradicting Prof. Scripture, for he was not in a position to even try to present his evidence at the time, but it seemed only right to present the Helmholtz side of the subject. As one who was on that side, he would be very glad to be convinced, and perhaps when some difficulties are removed he may be. At present, he is in a receptive state.

Dr. H. L. Swain said that the little he understood of the subject, he had learned when at Yale. Prof. Scripture began to study the question of the production of speech. He felt quite sure at that time that Prof. Scripture would discover something, and now was convinced that he had done so. Having had no other theory to go upon, we have all naturally based our ideas upon the Helmholtz theory. Prof. Hallock still speaks of the singing vowel rather than the spoken vowel. There is a well marked difference between these two. He hoped that Prof. Scripture would tell us wherein lies the difference between the sung *ah* and the spoken *ah*, and in what way we can get a tangible idea of its exact nature. When as laryngolo-

gists, we understand the difference between speaking and singing perhaps we can formulate some rules and regulations which will assist us in producing a system of voice culture that will apply to all, and will give us ample means of overcoming the difficulties which persons with fine voices have in retaining them through years.

One point upon which we are very deficient is a clear understanding as to the difference betweeen Prof. Scripture's "puff" theory and that of Helmholtz, when he says "there is no necessary connection between the pitch of the resonance cavities above the vocal cords and the chord-note." We have always supposed that the two must be in harmony according to the Helmholtz theory. Is it not possible that in singing we make the resonant cavities harmonious with the tone taken by the vocal cord? Do we not train our cavities to mould the sounds in such a way that they shall be strict overtones of the note taken by the chords in singing? When we talk we might not have to do this. Therein would exist at least one difference between singing and speaking.

Prof. Hallock does not see how a current of air through the chambers will not harmonize with the tone produced by the cord. The old boy trick of imitating a frog produces by the same current of air two different sounds which can be harmonic or inharmonic as one wishes, and we can make the whistle and have the cords vibrating in the same chamber harmonic or inharmonic as we please. It explains cases where we remove the larynx and have no connection between the chest cavity and the mouth, where the larynx is entirely removed, and the floor of the mouth cuts the trachea entirely off from the nose. The hissing of air from the separated tracheal opening modified by the position of the lips, tongue and cheek with the air taken in to the mouth enables a person without a larynx to make himself audible in this very room, from near the rostrum, to where I am, toward the rear. He could make a clear and definite sound that could be understood.

He also hoped that Prof. Scripture would have something to say about the use of the lips when we play a horn trumpet, or cornet. There the lips are pressed together tightly as we puff into a chamber of a vibrating character—trombone, cornet or French horn, as the case might be. The same sort of puff producing the widely differing musical tones according to the nature of the vibrating cavity. That is a demonstation of the "puff" theory, as Prof. Scripture has laid it before us. He had read what Prof. Scripture

has written, had thought it over, and felt that in the "puff" theory there has been made a distinct advance in the study of speech and spoken vowels, and that we will thereby eventually come into a saner conception of voice training and culture.

DR. DELAVAN said that being a physician and not a physicist he greatly appreciated what the physicist has done in general for the physician, particularly in this department of research. While the matter is far too technical to be discussed intelligently by most practitioners, they could all enjoy Dr. Scripture's lecture and his very ingenious demonstrations. He firmly believed that the work done by Dr. Scripture would prove of important practical value, and he expressed the hope that the principles advanced by him might be the beginning of much useful progress.

MR. EMERSON, of the Columbia Phonograph Co. said that he had come this evening to listen and with no idea of speaking, but felt that he would like to offer Prof. Scripture the facilities of the Columbia laboratory, where thousands of records are made every year, and they would welcome him or any other member of the Section who wished to pursue studies along this line of work. The instrument Prof. Scripture uses is somewhat different from that used by the Columbia Phonograph Co., and they would be glad to have him try their method.

DR. SCRIPTURE, in closing the discussion said that he and Prof. Hallock had begun their differences of opinion on this subject about ten years ago, and Dr. Swain had possibly hit on the cause of the difference. His work has been practically entirely confined to study of the speaking voice, so he could not answer Dr. Swain's question as to the nature of the voice in song. It was only six weeks ago that he had started a machine on the singing voice, and he was now working systematically to solve its nature. As to the speaking voice, he is certain that his position cannot be questioned.

The Relations of the Dental Arches to Pathologic Affections of Naso-Pharynx and Adjacent Parts.* By E. A. BOGUE, M. D.

Adenoids were only discovered a little more than fifty years ago. Teeth are found among the oldest remains of prehistoric man, yet the proper, normal arrangement of human dental arches was discovered less than twenty-five years ago. The intimate relation between these two discoveries has just begun to be understood.

* Read before the New York Academy of Medicine, Section on Laryngology and Rhinology, February 27, 1907.

For discussion see April number, 1907, page 317.

I desire in this paper to show that, in the great majority of cases, so far as I can learn, the causes which produce adenoid growths, are the same that produce narrow maxillary arches, and the converse is also true. What produces narrow maxillary arches will generally produce adenoid growths. This is admitting the presence of lymphoid tissue in all children at birth, and the possible demarcation of the tonsilar ring more accentuated at certain times than at others. But it is *not* admitting that every child has adenoids at birth. It is not until the lymphoid tissue has become hypertrophied, and thus pathological, that the term adenoids or lymphoid growths may be applied.

Next I want to show that, if taken early, say at about the sixth or possibly the seventh year, the correction of irregularities in the positions of the temporary teeth corrects impending irregularities in the permanent teeth and that process results in not only an enlargement of the dental arch, but so far as is now known, in a straightening of the nasal septum, lowering the high vault of the palate through the lateral spreading of the upper maxillary arch, and a consequent enlargement of the nasal passages and inferentially of all the adjacent bones of the face, nose and head. This enlargement of the nasal and post nasal passages precludes, so far as my experience goes, and so far as I can learn, all recurrence of lymphoid growths when once they have been eliminated.

I want to show, in the third place, that diagnosis of impending irregularities in and among the permanent teeth, is almost as clear at six years of age, while the temporary teeth are still in the mouth, as at twelve, when the permanent teeth are visible. I wish to show that operations for rectifying the conditions above mentioned, are more safely performed, with less pain, with apparently less general disturbance to the nervous system and more quickly than at any later period in life.

That these operations, performed thus early, are more likely to remain permanently successful than if done at a later period and that they have an influence which we can but little appreciate upon the permanent well being of the individual in after life. Vocalization, enunciation, mastication and breathing are brought nearer to perfection than they could otherwise be; and the personal appearance is made much better. All this makes a more efficient citizen.

When irregular teeth and narrow dental arches are found, with the characteristic physiognomy associated with adenoids, we expect in nearly all cases to find not only nasal stenosis, but that the ir-

regularity of the teeth is in proportion to the degree of deflection in the nasal septum, and diminution in the nasal passages. In all the skulls examined, a pronounced deflection in the nasal septum was invariable accompanied by an irregularity of the dental arches, greater or less according to the deflection of the septum.

As the etiology of narrow dental arches and lymphoid growths seem to be identical, they are associated in our consideration of them.

All babies, not deformed, at first sleep with their mouths shut and breathe through the nose. Some influence causes an inflammation of the mucous membranes of the nose, the inflammation extends to the naso pharynx, a thickening of the lining of the air passages results, and the child has to keep its mouth open to breathe until at last it has a chronic rhinitis, and the child becomes a mouth breather.

The membranes have become thickened by the inflammatory action and its sequelæ into the fungous growth of adenoid vegetations, and at once there is an arrest in the further lateral development of the upper maxillary bone. The cysts of the permanent teeth remain bunched in their insufficient spaces, and year after year goes by with scarcely any perceptible variation in the width of the upper jaw. The constant breathing through the mouth, the absence of the necessary stimulus of breathing through the nose, the lack of the absorbing qualities of the passing air and the dragging influence of the muscles all combine to keep the arch of the jaw narrow. Worst of all, mouth breathing causes the withdrawal of the muscular pushing tongue from its place in the roof of the mouth, where by the growth and constant pressure of that tongue the lateral growth of the upper jaw is promoted.

The statement that the tongue within, and the cheeks and lips without, are the main instrumentalities in the formation of the dental arches from the early stages of embryonic life, right on until maturity, is not by any means new; yet few practitioners realize the muscular and mechanical power of the tongue. A few days since I undertook to prevent a lad of ten years from placing his tongue over a tooth that I wished to examine. Three fingers and my thumb holding a mouth mirror were unable to control its movements.

This muscular tongue, when the mouth is closed, lies against the roof of the mouth, and as it grows, its enlargement laterally presses the dental arches outward, and so enlarges the upper jaw to its

proper size, as well as the lower jaw or mandible against which it is always pressing. The withdrawal of the tongue not only allows the arch of the jaw to remain narrow, but it causes the eruptive force of the teeth to be expended in an antero-posterior direction, almost to the exclusion of the lateral growth, from the time mouth breathing is established to the time that relief is afforded by surgical means.

While the adenoid operation in cases of narrow arches is not always successful in restoring nasal breathing, it is never successful in restoring the harmony of the features, the power of correct articulation, or the power of thorough and normal mastication. This requires a special operation, an expansion laterally of one or both dental arches, and a bringing into articulation and so far as possible into regularity all mal-articulated teeth. A. A.

Alypin and Novocain. M. RUPRECHT. *Monat. f. Ohrneh.* May 1906.

After lengthy and detailed account of a large experience with these new anæsthetics, the author arrives at the following conclusions:

1. Novocain is less irritating than alypin, but its anesthetic power, when applied to the mucous membranes is so small as to be practically useless. For hypodermic use it is an ideal anaesthetic when combined with suprarenin.

2. Alypin and supranenin is fully equivalent to cocaine or cocaine plus suprarenin. Alypin is less irritating and less poisonous than cocaine; secondary hemorrhages are less apt to occur; the solution can be boiled for 5 minutes without damage, and is therefor preferable to cocaine solution; it is also cheaper than cocaine.

3. Alypin does not cause contraction of the mucous membranes. It is somewhat more irritating than cocaine when first applied.

4. Alypin solution, made in 1:4000 watery solution of thymol, is fully as stable as a corresponding solution of cocaine.

YANKAUER.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Regular Meeting, November 12, 1907.

J. HOLINGER, M.D., President.

Tumor of Neck. By FISK, M. D.

Dr. Fisk reported the case of a man who complained of severe pain in the throat and inability to open the jaws, with hoarseness. There was a hard swelling under the angle of the jaw on the left side. The mass was incised, but no pus was found. When the patient was referred to the ear clinic, pus was discharging from the ear, and he could open his jaws about one fourth of an inch. There was a small, soft spongy body in the external canal, covered with skin, and a probe could be passed through the opening in the swelling down into the neck. Pus could be forced out through the ear on pressure. The soft palate in the region of the left faucial tonsil showed evidences of a peritonsillar abscess. The question was whether this was a peritonsillar abscess which had ruptured into the neck and then discharged through the external ear, or an abscess in the parotid region. No examination of the pus was made.

DISCUSSION.

DR. NORVAL H. PIERCE: I think that the microscope will clear up the diagnosis. Tuberculosis and syphilis can be excluded, although it is possible that tonsillar disease has been running and this is an exacerbation of a chronic condition, but I am inclined to think that it is actinomycosis, although the course is rather rapid.

DR. J. HOLINGER: The case looks like one of angina Ludovici which started as a peritonsillar abscess and ruptured into the neck.

Healed Primary Nasal Tuberculosis. By JOS. BECK, D. M.

To be published in full in a subsequent issue of THE LARYNGOSCOPE.

DR. W. L. BALLENGER: This patient came under my observation 13 years ago and remained under my care for six years. Previous to the time I saw her, she was under the observation of Dr. Max Throner for four years. She has a brother with the identical lesion in the nose. She was very well, unusually so, and no evidence of tuberculosis of the lungs could be found by Dr. R. H. Babcock and others, so that it undoubtedly was a case of primary nasal tuber-

culosis. A curious feature of the case was that the patient would cure herself, that is, get well without treatment at certain times of the year, leaving a smooth scar in the nose. In the winter the trouble would recur, so that in all probability the lady is now passing through one of her favorable periods, and I believe that a year hence Dr. Beck will again report her as cured. He has done it before, and doubtless will do it again.

The membrane in the nose is not healthy now. It is swollen and edematous, especially on the septum at the point of perforation. I believe that the disease will again recur, but it has made considerable progress since I saw the patient last, when she had no lesion, except on the left side of the septum, whereas now the anterior portion of the middle turbinate has been diseased and removed. The case certainly is an interesting one because of the automatic cure during the warm months.

DR. C. M. ROBERTSON: How much mercury and how much potassium iodide has the patient had?

DR. BECK: I have given her inunctions for eleven weeks followed by potassium iodide, as high as 340 drops a day.

DR. BALLENGER: I want to say that Dr. Thorner made the same diagnosis as Dr. Beck and I did.

DR. MAX REICHMAN: I would suggest that Dr. Beck try the Roentgen ray. The nasal cavities can be reached directly by the rays and tubercle bacilli are very apt to undergo certain changes under the influence of the rays. I think that a trial would well be worth while.

DR. J. HOLINGER: The case I showed four years ago ran the same course as Dr. Beck's case. Cases of tuberculosis of the nose are most tedious, and always have a tendency to recur. One point that struck me in this case is the extreme scar retraction in the left nostril, a common appearance in the later stages of the disease. The wings of the nose are drawn up and shriveled, and the entrance to the nose is smaller than normal.

DR. BECK: I gave the history of this case as I received it. The patient has been suffering for 20 years, although she has consulted physicians for only 15 years. As long as she was under treatment there was always a crust or scale present. She is free from that scale now. There has always been a red, elevated membrane with small, pin-point granulations. I believe that the patient is well now, although I am not certain of that. I will report further on the case later. In regard to the Roentgen ray, she has had eight weeks of treatment and also with radium and high frequency current.

Radiography in the Nose, Throat and Ear. By J. C. Beck, M. D.

Dr. Jos. C. Beck exhibited plates to show the value of the Roentgen ray in the diagnosis of diseases of the nose, throat and ear and as an aid in the treatment, and demonstrated the methods employed in making these radiographs.

DISCUSSION.

Dr. W. L. Ballenger: Dr. Reichmann has taken more than fifty plates for me during the past year, and I have had plates made by other radiographers. I have two plates showing an absence of the frontal sinuses, and some other interesting and curious conditions. In three cases, the anterior ethmoidal cells were found absent over the orbit. After removing the ethmoidal labyrinth, I could pass a probe across the orbit, two-fifths of the way across. So that removal of the ethmoidal labrynth is not complete. Sometimes the cells extend beyond the reach of surgical instruments. I have a case under observation now in which the posterior ethmoidal cells pass along the side of the sphenoid for 1½ inch, and I saw another specimen where the cells passed not only along the side of the sphenoid but behind it. In such cases we must resort to prolonged treatment to establish drainage from the remote cells.

Another case of bilateral frontal sinusitis was interesting. I found the mucous membrane on one side entirely gone. The X-ray plate showed on that side no such great density as on the opposite side. Dr. Coakley said that he was not sure what made the cloudiness; whether infiltration of the mucous membrane, pus or denuded bone.

The plates Dr. Beck shows are very beautiful and instructive and of great value in diagnosis; but it is not impossible to make a diagnosis without the X-ray, but we can make it more absolutely with the plate. The plate also shows the area of the field of operation, and it gives us an opportunity to plan the operation to better advantage and shows how much deformity we may expect to follow and what operation must be chosen. I have had only one case in which I did the Killian operation and in which there was marked deformity. The cells were deep and large.

The angle at which the rays are directed through the skull is of importance, and I am not sure that my plates have been taken at the correct angle.

Dr. R. H. Good: I have used this method in cases of mastoiditis and antral empyema and found it to corroborate the clinical find-

ings. In one case of mastoiditis, I took a picture at one angle and then at another, and by comparing the two plates I got positive evidence of the disease. By placing the plate horizontally it makes a good picture of the antrum better than of the frontal sinus. I have taken some pictures below the occiput and it makes a good picture of the antra but a poor one of the frontal sinuses. I believe that these X-ray pictures ought to be taken in every case. I have yet to see a case where the sinuses are filled with pus that does not show a shadow.

DR. NORVAL H. PIERCE: These two plates will demonstrate that the rays must pass at a certain angle to show the frontal sinuses. (Exhibited two X-ray plates.)

DR. MAX REICHMANN: I wish to congratulate Dr. Beck on the results he has obtained. Albers-Schoenberg showed that the frontal sinuses must be taken in the manner described by Dr. Beck, and all plates I have taken were taken in that manner, by directing the main or axial ray through the occiput. I took the first pictures with the patient in the horizontal position, but the remainder were taken with the patient lying on an incline. It is essential to use the compression apparatus because the patient can not lie perfectly quiet for two minutes. Even the breathing will move the head. I have endeavored lately to make the sinus pictures in stereoscopic views. The literature on the subject is very meager; in fact only two papers have been published, and one of these was by Wassermann.

As far as the sphenoid and ethmoid sinuses are concerned, all workers agree that it is impossible to make the diagnosis except when the tube is turned in such a way that only one sinus is taken at a time. This is possible by making an oblique exposure, but, unfortunately, we get disfigurement and the pictures are not good for diagnosis. The lateral view must show the mastoid cells, the auricle and the antrum Highmori. Another good method, although difficult for the patient to bear, is to introduce sounds into the cavities which are to be skiagraphed. I have had a few cases of suppuration of the frontal sinuses where the probe was introduced and it showed the conditions beautifully.

DR. G. P. MARQUIS: Dr. Beck is to be congratulated on his work, but I agree with Dr. Ballenger that in the great majority of cases we can make the diagnosis by simpler methods. I saw Killian do seven operations and at no time did he use the radiograph for diagnosis. The X-ray plate was used not so much from a diagnos-

tic standpoint as an aid in the operation. For this purpose the radiograph is an excellent thing.

DR. GEO. E. SHAMBAUGH: I wish to emphasize that we do not make a positive diagnosis of accessory sinus disease from X-ray plates alone. This diagnosis must finally depend in most cases upon careful intranasal examination. With such an examination the use of X-ray plates as an aid in diagnosis can in most instances be dispensed with. The great benefit of X-ray plates is that they give us an accurate idea in many instances of the exact outlines of the sinuses. This is especially true in case of the frontal sinus.

DR. S. FRIEDBERG: Dr. Reichmann spoke of putting a probe into the sinus to be X-rayed. I find that a method of considerable value especially in suitable cases.

DR. BALLENGER: Because we find evidence of disease in the frontal sinuses is not an indication for doing a radical operation. I have treated such cases intranasally with much satisfaction.

DR. BECK: I do not make my diagnosis by radiographic plates, but I think it is an aid in diagnosis and we ought to use it, and one reason why we do not make greater use of the method is because it has been unsatisfactory. You need not fear any ill results from this work. Anatomically it certainly is of great value to prove the existence of the sinuses. Dr. Good's statement does not conform to accepted methods of making radiographs. I would like to see his plates because it has been my experience that plates are no good when taken at an angle. I have looked over the literature on the subject. Albers-Schoenberg makes no particular mention of the line of the ray. Goodman, Killian's radiographer, discovered this particular point by accident. Stereoscopic views are beautiful and I am working on that now. We can demonstrate the depth of the sinuses and without any side views, except to tell the depth of the posterior frontal diameter. As for the use of sounds to demonstrate the mastoid, I have reserved that part for another paper. I find that sounds are not of much value in diagnosis.

A Case of Labyrinthine Deafness with Tone Island. By GEO. F. SHAMBAUGH, M. D.

To be published in full in a subsequent issue of THE LARYNGOSCOPE.

DISCUSSION.

DR. NORVAL H. PIERCE: It has been largely dwelt on that the so-called Bezold triad is essential to the diagnosis of otosclerosis, and in a recent paper, I tried to bring out the point that in otosclerosis

we have two factors working against each other as it affects the reaction of tuning forks. In one the bone conduction is increased and the low tone elevated and this is due to a spongification and ankylosis about the foot plate of the stapes. But that is not always the case. Spongification of the labyrinthian capsule may take place at any part, and if there is no spongification and ankylosis of the stapes, we do not have lowering of the tone limit nor prolongation of bone conduction or negative Rinné, but have the same reaction as in nerve deafness; namely, decrease of bone conduction and a positive or shortened Rinné. So that these cases can be grouped under the head of otosclerosis in the absence of other diseases to account for the condition present.

DR. J. HOLINGER: The case as described here is given in the textbook of otology by Bezold. Siebenmann wrote those chapters and gives almost the same experience with the only difference that the patients were women and not men, two sisters, who were treated for "hard hearing." One shows distinctly the symptoms of otosclerosis and the other of nerve deafness. This disease often affects sisters or brothers; then jumps a few generations and appears again. The principal muddle was caused when the word otosclerosis was coined. Siebenmann wanted to call it spongification, but the word otosclerosis was forced on him because it was in use before we knew the pathology of the disease. If the word spongification had been retained, then the location of the process would have been excluded, and then we would have had only this form; the spongifying outside of the oval window, and the other form, spongifying at the foot plate of the stirrup. But, no doubt, this is pathologically the same process and the location is a different one.

Bacteriology of a Case of Stomatitis in the Course of la Grippe.

MM. MONTFORT and FOSTINEAU. *Gaz. med. de Nantes.* Sept., 15, 1906.

Two days after the commencement of an attack of grippe in a child of 14 years, the velum palati, the uvula, the gums and the mouth were swollen and covered with a phlyctenular eruption accompanied by fever and repeated chills. The buccal mucosa was gently rubbed with a tampon of cotton and the bacteriological examination showed large numbers of thin, short bacilli, presenting all the characteristics of the microbe regarded by Teissier as the specific agent of la grippe. SCHEPPEGRELL.

THE AMERICAN LARYNGOLOGICAL ASSOCIATON.

Twenty-ninth Annual Congress. Washington, D.C., May 7 to 9, 1907.

A. W. DeROALDES, M. D., President.

Tuberculosis of the Accessory Sinuses of the Nose. By J. W. GLEITSMANN, M. D., New York.

(Published in full in THE LARYNOSCOPE, p. 445, June, 1907.)

DISCUSSION.

DR. C. C. COAKLEY: The case referred to by Dr. Geitsmann was one that was accidentally discovered in the pathological examination of the tissue removed from the antrum. Both antra were completely filled with thickened, edematous membrane, not different from that often found. There was no gross pathological change that could be determined. It was only on microscopic examination that the mucous membrane of one side was found diseased. Giant cells with tubercle bacilli in them were found, thus making the diagnosis of tuberculosis positive. The tissue came from all the accessory sinuses at practically all of the operations. This is the only case of tubercular infection that I have found in the mucous membrane taken from the deceased cavities. The case came to the out-patient department of our clinic and was under observation for nearly two years and a half, or three years after the operation; and the last time I saw the patient was a little over a year ago. At that time he had no evidence of tuberculosis in any other portion of the body.

PROF. GUSTAVE KILLIAN: During the last few years I have had a case of multiple tuberculosis of the bones with caries in the left frontal sinus. I opened an abscess and found the bone carious. I then had to do a frontal-sinus operation and also to remove a good part from the frontal bone and the temporal region. The tuberculous process had rendered the bone yellow. Only part of the bone being diseased, it was easy to see a clear division between the diseased and the normal part. I performed a thorough operation, and the wound healed by first intention. A few weeks aft-

erward, however, the patient had a recurrence; and the case has progressed as we are accustomed to see tuberculosis of other parts of the body do. I think that the lungs are about destroyed. It is very difficult to remove all the diseased part of the bone in this region and have a good recovery. There was tuberculosis of the maxillary bone and of parts of the walls of the antrum, but no pus. I have examined the mucous membrane of the frontal sinus microscopically and have found tubercles in it.

Dr. H. P. Mosher: The kind of tuberculosis described in the paper is a high-grade tuberculosis. There is, however, another form, a low grade of tuberculosis. It is a low grade of scleritis, which has defied treatment and diagnosis as to the cause. During the last six months it has been proved to be a low form of tuberculosis. The diagnosis was made by injections of tuberculin, and the treatment is carried on in the same way. Since the publication of this work I have been closely watching cases of sinus-disease, giving tuberculin in the hope of getting a reaction. The patients to whom I have given tuberculin, however, did not show any reaction. One of my colleagues was more fortunate. A typical case of empyema with pus in the cavities of the eye gave a reaction to tuberculin. It seems possible that a low grade of tuberculosis may be found to be the cause of the suppuration in the accessory sinuses.

Dr. Coakley spoke of not finding the bacilli. As a rule, one will not find the bacilli in these low forms. It would be rather uncommon to do so. I think it will be an extremely valuable fact to have, if the tuberculin is to settle the diagnosis or if it is to be a chief part of the treatment.

Dr. H. L. Swain: Is there any local reaction?

Dr. Mosher: No.

Dr. Swain: Would you use the tuberculin if there were advanced pulmonary tuberculosis?

Dr. Mosher: Tuberculin does very little good. I should not expect to get any results. I should use plain surgery.

Dr. Gleitsmann, closing: I am very happy, indeed, to hear from Dr. Coakley. I did not know that his case was still living a year ago. I hope the patient is alive now and that he may live a long time; because he is, very likely, about the only surviving case of sinus-tuberculosis. On the other hand, I am extremely grateful that the last very interesting case of Prof. Killian has not been

published yet; for in that case I could not have embodied it in my paper.

DR. J. SOLIS COHEN: That makes the discussion the more interesting.

DR. GEITSMANN: The subject touched upon by Dr. Mosher, I did not expect to come before the society in connection with my paper. I do not know whether he referred to some investigations made abroad by Dr. Bartles, recently published in the Zeitschrift f. Grenzegeb. He spoke of some investigations made in which they tried to find out what constitutes what was known some years ago as the tubercular state. Bartles had advanced the theory that before the appearance of tubercle bacilli there exists a pretuberculous stage, which manifests itself in lymphoid infiltration of the surrounding parts. It is the lymphoid stage of tuberculosis, but no actual tuberculosis exists. His opinion is that it is a stage that is brought on by hydremia of the parts involving the lymphoid tissue, similar to the hydremia observed in septic cases before the real septic symptoms manifest themselves, and in which the lymphatic system appears to be hydremic and slightly infiltrated before the septic condition really arrives.

I probably misunderstood Dr. Mosher to say that tuberculin has no effect in pulmonary tuberculosis.

DR. MOSHER: It has very little. When you have active bacilli you get little result.

DR. GLEITSMANN, concluding his closing remarks: I did not bring up this subject. The main use of tuberculin and its derivatives is to destroy the bacilli. They will not do any good in mixed infections. They will not reduce or affect favorably cheesy tissue. They only affect the bacillus. Dr. Mosher will find a number of publications in which tuberculin and its derivatives, among which I include all the preparations based on the production of tuberculin, have relieved the tuberculous process in a large percentage of cases of primary tuberculosis in which mixed infection did not exist.

Massage of the Pharynx; Exhibition of an Instrument used for the Purpose by a Famous Actor. By S. W. LANGMAID, M.D., Boston.

DISCUSSION.

DR. J. SOLIS COHEN: I have heard with great interest the paper, and have seen with interest the instrument. In the early days of laryngoscopy many of us had to use an instrument something like this to teach the patient to stand handling of the epiglottis. I used

what the dentists call the extension finger in order to accustom the patients to this, so that I might more readily make my applications. I attributed the improvement to the facility of the patients, and not to the instrument.

It would be interesting to have Dr. Langmaid tell us, in closing, how he uses his instrument for therapeutic purposes.

Dr. G. Hudson Makuen: Personally, I have always been under the impression that it is not so much the massage of the pharynx and the throat that renders the patient tolerant to instrumentation as it is the knowledge gained by the patient in attempting to massage or manipulate the throat with the toothbrush handle or some such instrument. If you can get the patient in possession of the right idea when his throat is being examined you will have very little trouble; but the patient's attitude is generally one of self-protection, rather than of co-operation. He is trying to keep from being hurt or from gagging and he is not giving you intelligent assistance. If you can teach him to control his organs voluntarily, so that when you say "Relax the soft palate," he will drop it down you will have no trouble in examining the pharynx or the larynx. I have recently had the pleasure of examining the throat of a noted actress. She paid no attention to what I was doing, but turned her eyes up to the ceiling. I would say, "Relax the throat," and she did it at once. This was not due to the fact that she had massaged her pharynx, but because she had the right idea of helping. My experience does not coincide with that of Dr. Langmaid, that singers and speakers have anemic pharynges. Some of them that have used the voice as Forrest did have hyperemic pharynges, and irritable ones.

Dr. Clarence C. Rice: I have found, as has Dr. Langmaid, that the throats of singers and actors are, as a rule, anemic, except when they have colds. Dr. Makuen has just taken the opposite view. My experience tallies with that of Dr. Langmaid, that either from intelligent treatment or from a lack of constitutional catarrh, noted singers and actors do not, as a rule, have much chronic pathological conditions. This winter I have seen three or four remarkable cases in persons that sing very well, who have had a tremendous amount of pathological condition. I have seen a tenor who had the entire postnasal space filled with adenoid tissue, and the lateral folds almost filling the upper pharynx. This has been a very serious drawback to him singing during the season. I have known noted sopranos with a long uvula and greatly congested tonsils,

who, yet, have persisted in singing and are very unwilling to undergo any sort of semi-operative treatment to remove these large pathological conditions, which would give them great relief. It seems to me that it depends a good deal upon what part of the country they come from. Two of these persons are Italians. In Italy singers have not had the amount of treatment that the French singers have had; so they are loathe to undergo treatment. My feeling has been that the strong use of the voice and the vibratory massage of the pharynx tend rather to atrophy and anemia than to congestion. I should suspect, if I found congestion in a singer's pharynx without the presence of any special nasal or postnasal catarrh, that it had been caused by alcohol or tobacco, rather than by the use of the voice. Massage, intelligently employed, seems to me a useful therapeutic measure.

DR. MAKUEN: I may have been misunderstood in what I said. I meant that following the faulty use of the voice we have the hyperemic and congested condition.

DR. LANGMAID, closing: I purposely did not mention anemia in my description of the throat; I said a lack of hyperemia. Dr. Makuen has now said that though he does not agree with me in other cases, in those in which there has been a wrong use of the voice he thinks that this swelling or hyperemia may occur. Dr. Rice has noticed in those observed by him that they had been nearly all winter in this condition. That is not the healthy condition which results from the proper use of the voice long continued. Certainly it has been an observation of mine, and it seems philosophical, that the singer or actor who has had a successful career must have a throat free from hyperemia. Unfortunately, as Dr. Rice has implied, the hyperemia, the length of the uvula, and various pathological conditions may be owing to the abuse of food or alcohol; and we will include smoking.

When he spoke of Italians, I agreed with him; for it is among these people that I have found the state he describes.

Dr. Makuen very properly and justly has spoken of the education of the throat in another way. I quite agree with him. I have no doubt that all of us have become more experienced than we were in the early years; but a little spurt of cocaine, and we are all right so far as getting a view of the patient's throat is concerned.

I wish to emphasize the value of instrumental massage of the throat. It is in accordance with the observations in external mas-

sage. The vessels are reduced to a proper size by the flowing away of the excessive blood; and after this there is a tonic contraction of the tissues. It is only lately that I have thought that it would be of service to prescribe it.

Removal of Papillomata of the Larynx by Direct Instrumentation with the Aid of Killian's Tubes. By CORNELIUS G. COAKLEY, M. D., New York.

DISCUSSION.

PROF. G. KILLIAN: I congratulate my friend Dr. Coakley upon his direct results in cases of papillomata of the larynx. At present, I have in my clinic two cases in which I have removed papillomata by the direct method. I introduced a tube between the epiglottis and the trachea. This gives a very good view of the interior of the larynx. You can then put in the instruments and take out whatever is necessary. The other method is to introduce a tube into the larynx. If this is done with the patient's head hanging over the edge of a table, the tube is very easily removed from the larynx and there is more ease in removing diseased parts; but it is necessary to cocainize the larynx very thoroughly. Otherwise it will contract so that nothing can be seen. If the cocainization has been thoroughly done, the patient breathes evenly, the vocal chords are open, and one can get a good view. This instrument is new.

It is a good thing that in cases in little children one can, by this method, remove papillomata of the larynx without performing laryngotomy. It was formerly necessary to perform laryngotomy quite frequently; because in this disease the recurrences are very common. In the literature of the subject for the last nine years there are ten cases requiring laryngotomy to one that could be done without it. In every case we can take the papillomata out by the direct method; and I hope that we can also avoid the many cases of tracheotomy formerly necessary if the patient comes to us before the disease has reached the condition that tracheotomy must be resorted to. If he can breathe sufficiently well to permit of general narcosis, the direct method of operating may be employed.

With this method, however, it is not possible to cure all the cases, the disease sometimes recurring as formerly. In such instances I would recommend doses of arsenic given over a long period. This drug is known to have the power of affecting favorably epitholiomata and papillomata, and I have had good results

from its use. It was advocated ten years ago by Dundas Grant, but forgotten.

I also recommend iodid of potassium, which has been used for a long time with good results. Papillomata that before its use had tended to recurrence did not recur. In another instance, the larynx was healed; this child has a very nice voice and can sing.

I wish to complete one case of Dr. Coakley's. I think it is the fourth. This patient, a girl, came to me with a letter from him, in which he stated that the larynx contained papillomata; but when I examined the child I found that these had disappeared. There are cases in which papillomata disappear spontaneously. I have seen another case over a period of fifteen years. Another child came to me with her larynx filled with papillomata, but the mother would not allow them to be removed. She left the place, but returned two or three years afterward. Nothing had been done, yet all the papillomata had disappeared.

Discussion of Dr. Coakley's Paper to be Concluded.
Proceedings of the American Laryngological Association to be Continued.

Chronic Ossifying Labyrinthitis. G. ALEXANDER. *Monatsschrift fur Ohrenheilkunde.* Aug. 1906.

The patient was a blind deaf-mute, 71 years of age, who died of general arteriosclerosis.

Microscopical examination of the internal ear showed the following changes:

1. Marked atrophy of all the branches of the auditory nerve and of its ganglia.
2. Total degeneration of all the nerve endings in the labyrinth.
3. Closure of the helicrotrema.
4. Partial bony occlusion of the beginning of the scala Vestibule.
5. Bridges of connective tissue stretching across the beginning of the scala tympani, and in the niche of the round window.
6. Atrophy of the stria vascularis; blood clots in both scalae.

On the left side these changes were more marked than on the right, and there was in addition considerable ossification of the structures of the labyrinth. The auditory nerve on both sides was reduced to a thread-like strand, but this atrophy became less marked towards the brain, so that at its entrance into the brain the nerve was of normal size; the cerebral centers were also normal.

YANKAUER.